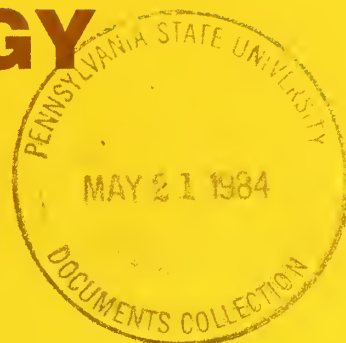


C51.17/11:983

FEDERAL TECHNOLOGY CATALOG

SUMMARIES OF
PRACTICAL
TECHNOLOGY

PB84-105634



**NTIS
Tech Notes
Annual Index**

U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

Center for the Utilization
of Federal Technology



ABOUT NTIS

As a cornerstone of the technological publishing structure in the United States, the National Technical Information Service (NTIS) is a key participant in the development of advanced information products and services for the achievement of U.S. productivity and industrial innovation goals in the 1980's.

NTIS, an agency of the U.S. Department of Commerce, is the central source for the public sale of U.S. Government-sponsored research, development, and engineering reports, and for sales of foreign technical reports and other analyses prepared by national and local government agencies and their contractors or grantees.

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Some 70,000 new technical reports of completed research are added annually to the *NTIS Bibliographic Data Base*. Anyone seeking the latest technical reports or wanting to compile unique subject groups of abstracts may search the *NTIS Bibliographic Data Base* online using the services of vendors or organizations that maintain the NTIS data base for public use. The whole data base in machine readable form may be leased directly from NTIS.

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c/o Edward Lehmann
Center for the Utilization of Federal Technology
National Technical Information Service
Springfield, VA 22161

FEDERAL TECHNOLOGY CATALOG 1983

SUMMARIES OF PRACTICAL TECHNOLOGY

*prepared by the
Center for the Utilization of Federal Technology
National Technical Information Service
U.S. DEPARTMENT OF COMMERCE*

January 1984

*U.S. Department of Commerce
Malcolm Baldrige, Secretary*

*Joseph F. Caponio
Director, National Technical Information Service*



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FEDERAL TECHNOLOGY CATALOG 1983

SUMMARIES OF
PRACTICAL
TECHNOLOGY

**NTIS
TECH NOTES
ANNUAL INDEX**

January 1984



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FEDERAL TECHNOLOGY TRANSFER

U.S. industry has a great opportunity to use the technology developed by the Federal Government. Each year, the Government spends billions of dollars on research and engineering efforts. Most of the results are announced in the tens of thousands of technical reports and papers issued by the Government, whereas other results may never be formally issued or may be delayed until final completion of a project many years after its conception. Because of this vast amount of Federal R&D and the difficulty in identifying the most useful, Government agencies and their laboratories are making a special effort to identify that technology having commercial or practical potential, and then alerting industry, and State and local governments, to its availability.

The National Technical Information Service (NTIS) is involved in this active effort to transfer Federal technology. In response to the Stevenson-Wydler Technology Innovation Act of 1980 (P.L. 96-480), the Center for the Utilization of Federal Technology (CUFT) has been established at NTIS to alert industry and government to that Federal technology with the highest potential for commercial or practical use.

Information products are one important link in this technology transfer process. NTIS, through the sale of technical reports, has always played a key role in transferring Federal research and technology to the private sector. NTIS has also developed special services to publicize and license Government-owned patents, to promote federally produced computer software, and to announce new technologies. One means of announcing this technology is through a special product called *NTIS Tech Notes*. This is a monthly subscription product alerting its readers to new processes, equipment, materials, and software.

ABOUT TECH NOTES

NTIS Tech Notes contain fact sheets (often with illustrations) of new processes and products determined to have potential utilization in both the public and private sectors. These fact sheets are contributed by a number of sources, including the Department of Energy (DOE), the National Aeronautics and Space Administration (NASA), the Department of Defense, and other Government agencies and their laboratories. Every month, the Center for the Utilization of Federal Technology (CUFT) receives between 80 to 100 fact sheets highlighting newly developed technology. These fact sheets include DOE energygrams, U.S. Army's DARCOM Manufacturing Notes, the long standing NASA Tech Briefs, and technology application assessments provided by the Offices of Research and Technology Assessment (ORTA), established by Public Law 96-480. These sheets are used to develop three technology transfer information products: (1) the current awareness monthly subscription service, *NTIS Tech Notes*, announcing the complete fact sheets as they are received by CUFT; (2) computer on-line access to summaries of the Tech Notes fact sheets; and (3) this Federal Technology Catalog.

ABOUT THIS CATALOG

This catalog is a compilation and index to the more than 1,000 Tech Notes announced in the past year. Each Tech Note fact sheet has been summarized to provide enough information to allow a judgment whether a particular technology is worth pursuing. It provides *NTIS Tech Note* subscribers an opportunity to access those Tech Notes not covered by their subscription category, and non-subscribers will be able to identify and locate new Federal technology announced in the previous year.

HOW TO USE

This catalog is divided into two main sections: (1) Technology summaries, and (2) a Subject Index.

Technology Summaries

The main portion of this catalog consists of 24 broad subject groupings of technology summaries. These groupings have been chosen to provide a rough cut of technology in order to allow browsing of broad applications. If a Tech Note is applicable to more than one catalog, its full summary will appear in the first category and be cross-referenced in the others.

Subject Index

The subject index allows access to specific technologies. Each Tech Note summary has been assigned between one and four specific subject terms for inclusion in the index. Each index entry lists the Tech Note title, the subject category where the full summary appears, and the catalog item number for easy location within this category.

PREVIOUS EDITION

The 1982 edition of this catalog is also available. Its price is \$19.50, order number PB83-121533. Please refer to the order form at the end of this catalog.

These Tech Notes summaries can also be searched on the On-line NTIS Bibliographic Data Base. For a free brochure write: Tech Notes On-line, NTIS, Springfield, VA 22161. Ask for the free booklet, number PR-725.

THE UNIVERSITY OF CHICAGO
CHICAGO, ILLINOIS
JANUARY 1950

TO THE PRESIDENT OF THE UNIVERSITY OF CHICAGO
FROM THE FACULTY OF THE UNIVERSITY OF CHICAGO
RESOLUTION OF THE FACULTY
PASSED JANUARY 19, 1950

WHEREAS, the Faculty of the University of Chicago has the honor to receive from the President of the University of Chicago a copy of the report of the Committee on the Faculty of the University of Chicago, dated January 19, 1950, and
AND WHEREAS, the Faculty of the University of Chicago has the honor to receive from the President of the University of Chicago a copy of the report of the Committee on the Faculty of the University of Chicago, dated January 19, 1950, and
THEREFORE, the Faculty of the University of Chicago resolves that it is its policy to support the President of the University of Chicago in his efforts to maintain the highest standards of academic excellence and to ensure the continued growth and development of the University of Chicago.

TECHNOLOGY SUMMARIES

Each technology summary is listed fully in only one of 24 possible subject categories. If a summary is applicable to more than one category, cross-references are provided. Within each category, each summary is arranged alphabetically by title. Each summary is assigned a specific catalog reference number for use with the subject index.

FULL SUMMARY SAMPLE ENTRY

Catalog reference number → 0560 **Metal Granulation Process for Production or Waste Storage** ← Title

Government agency → Department of Energy, Washington, D.C. Subscription categories in which Tech Note fact sheet appeared. ←

Date of announcement in NTIS Tech Notes → Mar 83 (C,D)

Technology summary { A low pressure, water blasting technique used to convert contaminated molten metals to coarse metal powder has been successfully demonstrated. The process is very simple and economical, with a high rate of production. The potential area of application is in waste management and disposal processes for both waste volume reduction and preparation of waste for ultimate disposal. The method could also be of interest in the production of granular metal.

FOR ADDITIONAL INFORMATION: Contact D. W. Jared, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830, (616) 574-4192. For publications, request support package 396/X/DB. } Source of additional information*

*If the source is NTIS, use the order form at the end of the catalog.



CROSS REFERENCE SAMPLE ENTRY

Metal Granulation Process for Production or Waste Storage ← Title

SEE 0560 ← Catalog reference number

VERBODEN TOEGANG
TOEGANG VERBODEN



TECHNOLOGY SUMMARIES

AERONAUTICS & AERODYNAMICS

0001 Advanced Aluminum Alloy Forged Helicopter Parts: Intermediate thermal/mechanical treatment improves alloy properties

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 (H)

Aluminum alloy die forgings made from specially-prepared forging stock have shown promise for use in some highly-stressed helicopter parts, according to an investigation conducted for the U.S. Army Aviation Research and Development Command. The forging stock is prepared by a sequence of kneading-type preforming operations and heat treated alloy forging was equivalent to or greater than that of the 2014-T6 forgings now used in production.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A086818, price code: A04.

Aircraft Antenna Repair Kit: Low-cost field repair takes 30 minutes and costs \$25 per antenna

See 0160

0002 Bearingless Helicopter Rotors: Simplified mechanical system can operate for hundreds of flight hours without failure

Army Materiel Development and Readiness Command, Alexandria, VA.

Aug 83 (D, F)

A report summarizes the results of a helicopter flight-research program to evaluate the capability to describe and predict structural and aeroelastic responses of an aircraft modified to incorporate a bearingless hub. The report, prepared for the U.S. Army Aviation Research and Development Command, includes data on loads, stability, handling qualities, and aircraft performance data. It also includes a discussion of the determination of the predictability of the technical characteristics of a helicopter using a flexible hub assembly to accommodate control-system pitch inputs and normal flap and lag motions.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A086754, price code: A08, or contact project officer H.R. Reddick (804) 878-5732.

0003 Bearings and Seals for Helicopter Transmissions: Test results indicate improved bearings and seals for advanced helicopter transmissions

Army Materiel Development and Readiness Command, Alexandria, VA.

Apr 83 (F, H)

A study evaluated improved bearings and magnetic seals for advanced helicopter transmissions and drive systems. Results of the bearing-material test program have indicated that the high-hot-hardness carburizing steel can be used for integrated gear and bearing components in advanced helicopter transmissions. The advanced analysis of complex bearing structures demonstrated the usefulness of a spring-gap model as a means of obtaining an accurate bearing internal-load distribution due to structural stiffness.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A090675, price code: A13.

0004 Calculating Helicopter-Fuselage Pressure Distribution: A modified potential-flow model gives useful design data

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 (D)

A method for computing the time-averaged pressure and velocity distributions at the surface of a helicopter fuselage has been developed at the laboratories of the U.S. Army Aviation Research and Development Command. Although the complete time-varying airflow must be known to calculate vibrations and other dynamic phenomena, the time-averaged flow can be used to estimate design values for the steady fuselage surface pressures and total loads.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A085968, price code: A04.

0005 Composite Structural Fittings and Attachments: Designs permit disassembly of major structural components on helicopters

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (D, H)

A detailed design, analysis, and testing program was conducted to develop low-weight, cost-effective structural joints and fittings made from fiber-reinforced composite materials. The program, conducted for the U.S. Army Aviation Research and Development Command, was aimed at helicopter joints and fittings that permit disassembly of major components. The three designs developed in the program are generic and easily adaptable to a wide range of applications.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A1110212, price code: A06.

0006 Costs and Benefits of Advanced Aeronautical Technology: Programs determine the advantages and disadvantages of advanced technology applied to civil aircraft

National Aeronautics and Space Administration, Washington, DC.

Dec 83 (A)

Programs available can be used to evaluate the economic feasibility of applying advanced aeronautical technology to civil aircraft of the future. The programs are composed of three major models: The Fleet Accounting Module, The Airframe Manufacturer Module, The Air Carrier Module. The Fleet Accounting Module estimates the number of new aircraft required as a function of time to meet demand. The Airframe Manufacturer Module analyzes the feasibility of manufacturing the new aircraft. The Air Carrier Module is a tool for analyzing the financial feasibility of an airline purchasing and operating the new aircraft. The models are written in FORTRAN IV and COMPASS.

FOR ADDITIONAL INFORMATION: Contact: COSMIC, Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602.

0007 Criteria for Safer Helicopter Landing Gear: a tentative new military specification is issued

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 (D)

A set of design criteria to improve the crash-landing capability of helicopter landing gear was evaluated in a study for the U.S. Army Aviation Research and Development Command. The study began with a review of the engineering literature on helicopter landing gear. Existing military landing-gear specifications were reviewed to determine their relevance to Army helicopter requirements. A design study was then performed to determine the practicality of designing landing gear to meet the tentative, new, higher impact criteria. Tailwheel tricycle, nosewheel tricycle, quadricycle, and skid configurations were considered.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A105 512, price code: A09, or contact project officer William A. Alexander (804) 878-5251.

0008 Displaying Helicopter Engine Data: Programmable model shows how pilots' jobs can be made easier

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 (B)

A report discusses a programmable feasibility model of a master monitor and display system for helicopter engines. The system is intended to reduce pilot workload. The report, which was prepared for the U.S. Army Aviation Research and Development Command, covers functional requirements and system interfaces, human factors engineering, methods of data transmission from sensors, and hardware. A quantity of seven switches was considered optimum on the basis of the subsystems to be monitored and the available space.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A105 082, price code: A03.

0009 Effects of Composite Materials on Avionics Equipment: Report suggests ways of coping with the absence of a built-in electromagnetic boundary

Army Materiel Development and Readiness Command, Alexandria, VA.

Oct 83 (B, H)

A report discusses the effects of advanced composite materials on avionics equipment. It identifies major problem areas; namely, lighting and electromagnetic pulse protection, the deterioration of antenna performance, electromagnetic interference and electromagnetic compatibility, and the reduction of radar cross section. Possible solutions to these problems are presented. The report, which was prepared for the U.S. Army Aviation Research and Development Command, devotes a separate section to problems peculiar to helicopters. Appendixes present technical background on interference control and electromagnetic environmental effects. An extensive bibliography is included.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number AD-A104015, price code: A07 or contact project officer F. Cansler (314) 263-1635.

0010 Flexible Aircraft Takeoff and Landing Analysis: Program Includes maneuver logic and autopilots for glide slope flare, landing, and takeoff

National Aeronautics and Space Administration, Washington, DC.

Nov 83 (A, D)

The Flexible Aircraft Takeoff and Landing Analysis program, FATOLA, simulates aircraft take off and landing dynamics. FATOLA represents an airplane either as a rigid body with six degrees of freedom or as a flexible body with multiple degrees of freedom. The airframe flexibility is represented by the superposition of up to 20 free vibration modes on the rigid-body motions. The analysis includes maneuver logic and autopilots programmed to control the aircraft during glide slope, flare, landing, and takeoff. The program is modular so that the performance of the aircraft in flight and during landing and ground maneuvers can be studied separately or in combination. The program is written in FORTRAN IV for batch execution.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112 Barrow Hall, Athens, GA 30602. Refer to LAR-12992/TN.

0011 Graphite/Epoxy Composite Nose Cone: High-strength composite proves significant reductions in weight

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 (H)

A program to design lightweight, stiff missile structures has resulted in the research and development of an ultra-high-modulus (UHM) graphite/epoxy composite. The work, conducted for the U.S. Army Materials and Mechanics Research Center, may be of interest to aircraft manufacturers and the producers of vehicles using composite materials. Previous studies showed that structural weight could be reduced by two-thirds using UHM graphite/epoxy over aluminum. Two types of flat laminate test panels were tested prior to fabrication of the conical shells (grustums). The first type was spliced longitudinally to evaluate the use of gore sections, which produce splices, during manufacturing. The second type had titanium foil interleaved between the graphite/epoxy plies to simulate forward and aft joints.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A103 836, price code: A06 or contact project officer Lewis R. Aronin (617) 923-3700.

0012 Helicopter Subsystem Monitor: Monitor produces detailed display of helicopter operation

Army Materiel Development and Readiness Command, Alexandria, VA.

Jul 83 (K)

Efforts to reduce the workload of helicopter crews have resulted in the design of a subsystem status monitor (SSM). This work was conducted for the U.S. Army Aviation Research and Development Command. Included in the study were the identification and analysis of parameters, the assessment of information-handling formats, preliminary designs, design evaluations, and the identification of peripheral functions. The SSM system design consists of two main multifunctional display screens and an associated caution/precaution/warning (CPW) status display with digital readout for the main rotor speed.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A08135, price code: A12, or contact project officer Joseph D. Dickinson, (314) 263-1625.

0013 Helicopter-Rotor Test Results: Performance and load data are compiled for full-scale-model tests

Army Materiel Development and Readiness Command, Alexandria, VA.

Apr 83 (D)

A report presents the results of wind-tunnel tests on a helicopter rotor. Although the numerical results are applicable only to the particular rotor/hub/test module combination, the report may be of interest to engineers involved in the design and testing of helicopter rotors, propellers, and fans. Tests were performed at various rotor speeds, angles of attack, and blade-pitch settings. Results are presented in tabular form without comment, with references to discussions in other reports.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A091690, price code: A19, or contact project officer Wayne Johnson, (314) 263-1625.

0014 High-Modulus Composites for Helicopter Shafts: Candidates are screened for impact resistance, stiffness, and low weight

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 (H)

Various fiber-reinforced plastic composites are under consideration for use in the construction of helicopter tail-rotor drive shafts. A materials screening program and a design, fabrication, and test program and being conducted by the U.S. Army Armament Research and Development command. The objective of the latest phase of this work is to overcome the brittleness of a previously-developed graphite composite shaft, which provided a 53.1-percent savings in weight over the aluminum shafts currently in use. Of the 36 composites tested, 2 showed exceptional performance - 1 consisting of E-glass fibers woven in an epoxy resin matrix and the other consisting of Kevlar-49, or equivalent, fibers woven in the same epoxy matrix.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A086849, price code: A07 or contact project officer Charles C., Wright (201) 328-3469.

0015 Hydraulic Power Supply for Angular-Rate Sensors: Preliminary design shows reduced cost and complexity in a hydraulic control system

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (D, K)

A hydraulic power supply has been under development to provide stable pressures and flow rates for laminar-jet angular-rate sensors (LJARS). The project is being conducted for the U.S. Army Electronics Research and Development Command. The proposed system is immersed in a sump filled with a silicone hydraulic fluid. (A phenylmethyl polysiloxane fluid was found to have the best properties).

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by order-

ing the NTIS report, order number: AD-A108729, price code: A03.

0016 Loads and Pressures on Axisymmetric Bodies with Cruciform Fins: Program computes forces and moments on supersonic configurations experiencing pitch and roll

National Aeronautics and Space Administration, Washington, DC.

Dec 83 (A, D)

The NSWCDM computer program calculates the aerodynamic loading and pressure distributions on supersonic configurations consisting of axisymmetric bodies with cruciform or planar canard and tail fins. This versatile program allows for the configuration to be pitched and rolled, and the fins may be deflected. The rail fins may be inter-digitated with respect to the forward fins. Fins may have arbitrary planform and thickness but must be planar. The load calculations provide aerodynamic forces and moments acting on the entire configuration. NSWCDM is written in FORTRAN IV.

FOR ADDITIONAL INFORMATION: Contact: COSMIC, Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602.

0017 Making Airfoils From Braided Composites: Improvements include lower cost and increased resistance to damage

Army Materiel Development and Readiness Command, Alexandria, VA.

Jan 83 (G, H)

An improved process for manufacturing helicopter rotor blades has been developed for the U.S. Army Aviation Research and Development Command. The blade is designed with an advanced aerodynamic shape and is fabricated with composite tubular braiding/epoxy. Detailed blade-spar design was done in an iterative program of braiding trials to define fiber orientations, coupled with blade design and analysis.

FOR ADDITIONAL INFORMATION: You can learn more details about this technology by ordering the NTIS report: AD-A109377, price code: A05 or contact project officer Mark L. White (314)263-1625.

0018 Miniature Two-Axis Joystick Controller: Pilots like the feel of a new device

National Aeronautics and Space Administration, Washington, DC.

Aug 83 (B, H)

A novel movable-button-actuated self-centering controller uses optoelectronics to produce X and Y signals for aircraft control. In addition to being extremely compact (1.0 in. in diameter by 1.3 in. tall, excluding the button). The device puts out voltages having a high signal-to-noise ratio, especially at the critical center position where in many controllers this ratio is poorest. The combination of a new saddle-shaped button and positive centering gives a 'feel' and 'breakout' (the pressure necessary to overcome the self-centering action) that have met with pilot approval.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: ARC-11372.

Onboard Oxygen Generation System

See 0066

0019 Parachute Line Hook Includes Integral Loop Expander: Parachute packing is simplified with a modified line hook

National Aeronautics and Space Administration, Washington, DC.

Sep 83 (F)

Using a modified line hook developed at Langley Research Center, one person now packs parachutes for test recovery vehicles faster than it previously took a two-person team. The new line hook includes an expander that opens up two locking loops so that the parachute lines can be pulled through them. In the old method, one person operated the line hook while the other person expanded the loops by hand.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to Howard J. Osborn, Langley Research Center, Mail Code 279, Hampton, VA 23665; (804) 827-3725. In either case refer to LAR-12875.

0020 Predicting Elastomeric-Bearing Life Expectancy: Service life can be estimated without testing to failure

Army Materiel Development and Readiness Command, Alexandria, VA.

May 83 (D, H)

A method of predicting the service life of elastomeric bearings for helicopter rotors was developed. The most critical elastomer layer, in terms of strain, is determined by finite-element analysis. The strains calculated for the layer are imposed on a standard test specimen. The edge shear strain is reproduced on the specimen by a steady compression load, while the dynamic torsional shear strain applied to the specimen is varied. An S-N curve (strain versus number of stress cycles) is plotted from the measured test data. The service life of the bearings can then be predicted from the curve by Miner's cumulative-damage theory. The new prediction method can greatly reduce the cost of testing elastomeric bearings for service-life expectancy.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A091756, price code: A05.

Regenerative Turboshaft Engines: Helicopter engine reduces specific fuel consumption by 25 percent

See 0159

0021 Repairing Composite Fuselages: Patch kits and modular construction will speed helicopter repairs

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 (H)

Composite (epoxy/fiber) rear helicopter fuselages may soon be easier to repair, according to a study for U.S. Army Aviation Research and Development Command. The combination of modular design with patch-kit and mechanical field-repair methods requires no extensive training and reduces the repair costs of the most common types of fuselage damage. In addition to general-purpose patch kits commonly used for automobile and marine body work, helicopter field-repair stations would also stock specialized patches tailored for specific fuselage sections.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A087609, price

code: A06 or contact project officer Thomas E. Condon (804) 878-5620.

0022 Rod-Wall Sound Shield for Wind Tunnels: Test model is shielded from turbulence radiated from wind-tunnel walls

Army Materiel Development and Readiness Command, Alexandria, VA.

Apr 83 (K)

In supersonic and hypersonic wind tunnels, noise (pressure fluctuations) radiating from a turbulent boundary layer on the tunnel wall can cause premature transition of the model boundary layer. A new designed structure shields an aircraft model from boundary-layer noise radiated from wind-tunnel walls. The shield is composed of four walls forming an open-ended box surrounded by a vacuum chamber.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number NASA-TP-1672, price code: A05.

0023 Safety Procedures for Aviation Material: Existing test methodologies and techniques are identified

Army Materiel Development and Readiness Command, Alexandria, VA.

Oct 83 (E, K)

A report is available on procedures for determining the degree to which a wide variety of aviation equipment and systems meet safety standards. The test operations procedures were prepared by the U.S. Army Test and Evaluation Command. Covered by the report are guidelines for test facilities and measuring and recording instrumentation, test preparations, test controls, safety procedures, and data reduction and presentation. Also included are specific checklists for airframe hazards, mechanical hazards, and miscellaneous hazards ranging from safeguards for toxic dusts and fumes to dangerous radiation. A safety guide is provided for laser equipment.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A110361, price code: A03.

0024 Semilempirical Estimate of Aircraft Wing Weight: Method draws on theoretical equations and a data base to optimize estimates

National Aeronautics and Space Administration, Washington, DC.

Jun 83 (D)

A computational method estimates the weight of aircraft wings from theoretical relationships and empirical data. It permits the comparison of alternative materials, methods of construction, and design philosophies. The method can be used to make tradeoffs in preliminary design phases on the basis of simple input data and for more accurate calculations in later phases when more data are available. It eliminates the discontinuity inherent in comparing calculations made by different methods in different design phases. The method is applicable to all types of commercial, general aviation, and others. Although developed expressly for aircraft wings, the principle can be adapted to weight and strength calculations for other structures, such as suspension bridges, warehouses, and indoor arenas.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: ARC-11435/TN.

0025 Steady, Oscillatory, and Unsteady Subsonic and Supersonic Aerodynamics: Modular program is compatible with most geometry preprocessors

National Aeronautics and Space Administration, Washington, DC.

Jan 83 (A, D)

The computer program SOUSSA-P (Steady, Oscillatory, and Unsteady Subsonic and Supersonic Aerodynamics - Production Version) accurately and efficiently evaluates steady and unsteady aerodynamic loads on aircraft having arbitrary shapes and motions, including structural deformations. The SOUSSA-P1.1 program is a pilot code for 'production' applications. It is modular, allowing updating and incorporating improved or additional capabilities. SOUSSA-P1.1 is compatible with most of the currently-available geometry preprocessors. It is very useful for multiple-frequency and repeated mode-shape evaluations. The program is written in FORTRAN IV and Assembler for batch execution and has been implemented on a CDC CYBER 70-series computer using the NOS 1.4 operating system with a central memory requirement of approximately 60K (octal) of 60-bit words.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to LAR-12433.

0026 Stress Analysis of Tetracore: Study evaluates the structural behavior of this tetrahedral structure

Army Materiel Development and Readiness Command, Alexandria, VA.

Jul 83 (D, H)

Tetracore is a three-dimensional tetrahedral structure fabricated into panels for potential use in aircraft construction. Tests to evaluate the structural behavior of tetracore, as well as to verify the results from a finite-element stress-analysis computer program, were conducted by the U.S. Army Aviation Research and Development Command. The static tests involved three-point bending tests, flatwise compression tests, and torsional tests.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A083244, price code: A02 or contact project officer I. E. Figge, Sr. (804) 878-3303.

0027 Supersonic-Wing Nonlinear Aerodynamics: Predictions of wing overall force and moment coefficients improved

National Aeronautics and Space Administration, Washington, DC.

Nov 83 (A, D)

The Supersonic wing Nonlinear Aerodynamics computer program, LTSTAR, estimates the nonlinear aerodynamics characteristics of a wing at supersonic speeds. This corrected linearized-theory method accounts for nonlinearities in the variation of basic pressure loadings with local surface slopes, predicts the degree of attainment of theoretical leading-edge thrust forces, and estimates detached leading-edge vortex loadings that result when the theoretic thrust forces are not fully realized. LTSTAR is useful in design studies aimed at aerodynamic performance optimization and in providing more-realistic tradeoff information for the selection of wing planform geometry and airfoil section parameters. The program is written in FORTRAN IV for batch execution.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to LAR-12788/TN.

0028 Tubular Braiding Rotor Spars: Helicopter main-rotor spar costs can be reduced by a third

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (G)

A program to enhance the operational characteristics of helicopter blades has resulted in the development of a mechanical tubular-braiding process for the manufacture of composite blade spars. The program was conducted for the U.S. Army Aviation Research and Development Command. Compared to filament-winding processes that are used to fabricate composite spars, mechanical braiding is less expensive and allows greater manufacturing flexibility. The mechanical-braiding process employs a rotary braider similar to the textile machines used to weave tubular fabric. In contrast to fiber winding, tubular braiding deposits a much higher number and volume of filaments simultaneously at rates 20 to 30 times those obtained on conventional winding equipment.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A109377, price code: A05 or contact project officer Mark L. White (314) 263-1625.

0029 Two-Dimensional Grids About Airfoils and Other Shapes: Program treats arbitrary boundaries through solutions of Poisson's equation

National Aeronautics and Space Administration, Washington, DC.

Jan 83 (A, D)

The ability to treat arbitrary boundary shapes, including those about airfoils, is one of the most desirable characteristics of a method for generating grids. The GRAPE computer program generates two-dimensional finite-difference grids about airfoils and other shapes by the use of the Poisson differential equation. GRAPE can be used with any boundary shape, even one specified by tabulated points and including a limited number of sharp corners. Numerically stable and computationally fast, GRAPE provides the aerodynamic analyst with an efficient and consistent means of grid generation. GRAPE is written in FORTRAN IV for batch execution and has been implemented on a CDC 6000-series computer with a central memory requirement of approximately 135K (octal) of 60-bit words.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to ARC-11379.

0030 Vertical Profiles for Turbojet-Powered Aircraft: Optimum profile minimizes operating cost

National Aeronautics and Space Administration, Washington, DC.

Dec 83 (A, D)

The OPTIM computer program generates optimum vertical profiles for turbojet-powered aircraft. Specifically, OPTIM generates a profile of altitude, airspeed, and flightpath angle as a function of the range between a given set of origin and destination points for particular models of transport aircraft. The profile may be optimized in the sense of minimizing fuel or time or in minimizing the direct operating cost expressed as a combination of fuel and time. Inputs to

the program include the vertical wind profile, the aircraft takeoff weight, and the aircraft engine and aerodynamic characteristics. The optimum vertical flight profile is generated by calculating the airspeed and thrust required to minimize the Hamiltonian at specific energy increments. OPTIM is written in FORTRAN IV.

FOR ADDITIONAL INFORMATION: Contact: COSMIC, Computer Software Management and Information Center, Athens, GA 30602.

AGRICULTURE & FOOD

0031 Agricultural Engineers Save Water With A Fabric Dam

Department of Agriculture, Washington, DC.

Nov 83 (D)

A fabric dam that controls water levels, increases crop yields and collapses automatically to allow flood waters to pass will be of use in designing future water resource projects. The term fabridam refers to a structure made of a two-ply nylon, rubber-coated fabric bolted to concrete pads which are placed in stream bottoms and on sides of channel banks. The dam was designed for controlling stream water levels which will, in turn, control the water table under the soil.

FOR ADDITIONAL INFORMATION: Contact: Coy W. Doty, ARS, Coastal Plains Soil and Water Conservation Research Center, P.O. Box 3039, Florence, SC 29502; (803) 669-5203.

0032 Biomass Model of Reservoir Fish and Fish-Food Interactions

Department of the Interior, Washington, DC.

Nov 83 (A, E)

A mathematical model was developed to help fishery managers evaluate the food-chain relations of fishes in reservoirs and to assess the effects of changes in reservoir operations, fishery management practices, or harvest on fish and fish-food organisms. Input data consist of the standing crop of fish (weight per unit area, by species and size classes) sampled during the growing season. The model estimates the biomass of fish supported by diets of plants, detritus, benthos, zooplankton, fish, and terrestrial invertebrates. It also provides conservative estimates of fish production and the amount of food of a particular type required annually to maintain the biomass of fish that eat each type of food. In five consecutive years of testing, this model has been verified and has proven useful in explaining the seasonal dynamics of fish biomass. From estimates of the biomass of fish supported by diets of the six principal fish foods in reservoirs, inferences can be made about the importance of the production by the six food categories. A computer program is available from NRRP for the IBM 370/155 computer and for the HP 9830A calculator. The model will be run by NRRP staff on request. Appropriate fish standing crop data are required.

FOR ADDITIONAL INFORMATION: Contact: National Reservoir Research Program, U.S. Fish and Wildlife Service, 100 West Rock Street, Fayetteville, Arkansas 72701; 521-3063.

0033 Cablegation Irrigation System Can Be Used With Gated Pipe

Department of Agriculture, Washington, DC.

Aug 83 (D)

Cablegation, a new energy-saving automatic surface irrigation, can now be used in the conventional gated pipes many growers already own. Designed for growers who need a now-cost alternative to sprinkler systems, cablegation uses gravity to deliver water to furrows automatically and sequentially. By combining the energy efficiency of gravity-flow surface irrigation with low labor and uniform water applications approaching those of sprinkler systems, cablegation provides such an alternative. Once put into place, cablegation is relatively inexpensive to operate. The major cost of the system has been the purchase and installation of a single, carefully graded PVC pipeline. The ability to adapt cablegation to gated pipe already owned by a grower eliminates much of the system's expense. Cablegation operates by placing inside a pipe a plug attached by cable to an outside feeder reel.

FOR ADDITIONAL INFORMATION: Contact: W. Doral Kemper, Director, Snake River Conservation Research Center, Route 1, Box 186, Kimberly, ID 83341; (208) 423-5582.

0034 Cablegation Makes Bordered Strip Irrigation More Practical

Department of Agriculture, Washington, DC.

Aug 83 (D)

Bordered strip irrigation for highly penetrable soils is a more practical alternative to furrow irrigation when cablegation, a new energy-saving, automatic surface irrigation system, is used. When soils with high infiltration rates are irrigated, water must be moved down the fields quickly. Otherwise, the lower ends of fields receive little water, while the upper ends become so saturated that excess water percolates below plant root zones, leaching away nitrates and often picking up harmful salts which ultimately get deposited into rivers. Research has shown that bordered strips are excellent for moving water quickly down a field. Instead of being dispersed into many furrows, water is concentrated in strips ranging from 20 to 100 feet wide. The strips are bordered on each side with six-inch high earth dikes and leveled to have no side slope.

FOR ADDITIONAL INFORMATION: Contact: W. Doral Kemper, Snake River Conservation Research Center, Route A, Box 186, Kimberly, ID 83341; (208) 423-5582.

0035 Chemical Compound Produces Amazing Orchard Results

Agricultural Research Service, Washington, DC.

Jan 83 (E)

ICI pp333, a growth-retarding chemical compound used experimentally to control grass growth for seed production, has been adapted to fruit trees. This culminates a 20-year search for a means of reducing orchard foliage production while increasing fruit-production efficiency. Excessive foliage is the biggest problem faced by fruit producers. Besides using energy that could be directed to fruit production, a thick canopy of leaves keeps the fruit from receiving sunlight and interferes with disease and insect control treatments. The potential of ICI pp333 is enormous. Reduced foliage production not only means substantially greater fruit production, it also makes for a much easier harvest and, of course, sharply curtails the need for pruning, one of a grower's most costly operations. The compound is applied directly to the soil. No chemical residues have been found in the fruit so far.

FOR ADDITIONAL INFORMATION: Contact: Lynn Yarris, USDA Western Region, 1333 Broadway, Suite 400, Oakland, CA 94612; (415) 273-6052.

0036 Development of Hormones to Stimulate Spawning in Exotic Fish Species

Department of the Interior, Washington, DC.

Oct 83 (C)

Development of methods to allow spawning of exotic fish in Florida will decrease the Nation's dependence on foreign imports. A variety of hormones have been developed and used to stimulate the artificial spawning of species which previously had not been possible. Methods applicable to other species are being developed. Methods being developed should allow the artificial spawning of most species presently used by the industry. The methods under study can be used at any time of the year rather than having the natural spawning occurring only during relatively short periods of time naturally. This will also facilitate selective breeding and the production of hybrids and special strains.

FOR ADDITIONAL INFORMATION: Contact: James A. McCann, National Fishery Research Laboratory-Gainesville, U. S. Fish and Wildlife Service, 7920 N.W. 71st St., Gainesville, Florida 32606.

A Device for Vacuum Degassing Small Volume Water Flows

See 0439

0037 Germplasm Resources Information Network: Computers to Keep Track of Nation's Plant Resources

Department of Agriculture, Washington, DC.

May 83 (E, B)

Computer network now being developed will do for plant scientists worldwide what seed catalogs do for gardeners--help them find the plants they are looking for. What sets the U.S. Department of Agriculture's future electronic catalog apart from the gardener's is its size. More than 600,000 different plants from all corners of the world will be cataloged in the new computer-assisted germplasm Resources Information Network (FRIN). The network will provide data on yields, winter hardiness, days to maturity, resistance to diseases, and other characteristics that plant breeders need. Also, the network will make it easier to locate seeds and cuttings stored in the system's repositories located across the country and speed shipment to plant specialists.

FOR ADDITIONAL INFORMATION: Contact: Mr. Dan Nisenegger, Room 123, Bldg. 005, BARC West, Beltsville, MD 20705; (301) 344-3084.

0038 A Heat Pump for Aquaculture Operations

Department of the Interior, Washington, DC.

Nov 83 (D, F)

In an effort to reduce energy consumption and operating costs, a liquid to liquid heat pump was installed in an aquacultural application to transfer heat from discharge water to incoming water. The energy produced by an oil fired boiler. The capital investment was recovered in less than 2 years of operation. The system employs a closed loop with external heat exchangers to avoid metal contamination from internal heat exchangers.

FOR ADDITIONAL INFORMATION: Contact: Joe Fuss, National Fishery Research and Development Laboratory, R.D. 4, Box 63, Wellsboro, PA 16901 (717)-724-3322.

0039 High Protein Diet For Atlantic Salmon Grow-Out Programs

Department of the Interior, Washington, DC.

Nov 83 (E)

An Atlantic salmon grow-out diet called ASD2-30 (originally called diet 406) was developed and formulated at the Spearfish Diet Development Center. The product outperformed several other diets. This diet has application in artificial propagation of Atlantic salmon. Its application may extend to other salmonid culture operations.

FOR ADDITIONAL INFORMATION: Contact: Carol Lemm, National Fishery Research and Development Laboratory, R.D. 4, Box 63, Wellsboro, PA 16901; (717) 724-3322.

0040 Management Information System For Fish Plant Operations: A real time computer data acquisition system to improve fish plant production and efficiency

Department of Commerce, Washington, DC.

Jul 83 (A, D)

A real time computer based data acquisition and analysis system for the management of fish plants has been developed at the Northeast Fisheries Center, Gloucester Laboratory. The system utilizes off-the-shelf hardware and commercially available minicomputer. Remote key-board entries with simplified entry codes and automatic error detection provides the input to the MIS. The output provides current information on raw material usage, labor costs, quality control and finished products. The system has potential for applications to other small plant and business operations.

FOR ADDITIONAL INFORMATION: Contact: Mr. Robert E. Learson, NMFS/NEFC/Gloucester Laboratory, NOAA, Emerson Avenue, Gloucester, MA 01930; (617) 281-3600.

0041 Math Model Developed to Determine Soil Erosion and Soil Productivity

Department of Agriculture, Washington, DC.

Sep 83 (D)

A new mathematical model that will be capable of determining the relationship between soil erosion and soil productivity is nearing completion. Soil erosion depletes soil productivity, but the relationship between the two is not clearly defined. The new mathematical model was developed to clarify this relationship. The model, called EPIC (Erosion-Productivity Impact Calculator) will be capable of simulating hundreds of years of erosion, an often slow process. The model includes two types of components: physically-based components for simulating erosion, plant growth, and related processes, and economic components for assessing the cost of erosion and determining management strategies..

FOR ADDITIONAL INFORMATION: Contact: J. R. Williams, Grassland, Soil and Water Research Laboratory, P.O. Box 748, Temple, TX 76503; (817) 774-1201.

0042 Microcomputer Simplifies Weighing of Crop Insurance Benefits

Department of Agriculture, Washington, DC.

May 83 (A, B)

Weighing the benefits of crop insurance is easy with new microcomputer software programs called ARCIE, short for All-Risk Crop Insurance Evaluation. The programs help producers assess their individual crop production risks and evaluate how crop insurance would work for their farms. Both analyze risk based on input by producers and historical data and provide tables and graphics. Farmers calculate results for a single insured unit on a planted per-acre basis.

Two versions are available, and both are compatible with most home computers.

FOR ADDITIONAL INFORMATION: Agricultural Extension Service, Dr. Buel Lanpher, (202) 447-7165.

0043 Molluscan Aquaculture: Improved Techniques for Hatchery Production

Department of Commerce, Washington, DC.

Jul 83 (C)

Improved techniques have been developed for hatchery production of various marine mollusc species and their grow-out under semicontrolled field conditions. Applied research is culture meteorology, genetics, algal food systems, and shell fish diseases has produced techniques which have potential for direct use by industry as well as state and other Federal agencies. Possible applications in the development of new species aquaculture systems and selectively bred hybrid mollusc stocks with superior commercial characteristics.

FOR ADDITIONAL INFORMATION: Contact: Dr. James E. Hanks, Director, Milford Laboratory, NOAA, National Marine Fisheries Service, 212 Rogers Avenue, Milford, Connecticut 06460; (203) 783-4240.

0044 Pumping Air Through Leaves Indicates Plant Stress

Department of Agriculture, Washington, DC.

Nov 83 (E)

Knowing exactly when and how much water is needed by plants has been a problem for farmers since irrigation began. Increasing costs for water and the energy to pump it, plus decreasing supplies, make accurate estimates even more important. Results of a study propose that measurements of the pressure required to pump air through plant leaves may provide a better indication of plant stress, the period when plants stop growing, caused by inadequate water. If irrigators can detect when plant stress is just beginning, they can arrange for water delivery before the crop becomes too stressed. A small air supply hose was clamped to the lower side of a corn leaf, and sensitive electronic equipment was used to measure the amount of pressure required to move air through the leaf. When stomata are fully closed, 7 centimeters of water in excess of atmosphere pressure is required. When stomata are fully open, less than one centimeter pressure in excess of atmospheric is needed to move air through the leaf. Preliminary data look promising for accurately predicting stress before too much potential crop yield is lost. If additional studies with wheat and beans are as encouraging, small equipment packages might be developed to place in several field locations.

FOR ADDITIONAL INFORMATION: Contact: Dr. Edwin Fiscus, Crops Research Laboratory, USDA-ARS, Colorado State University, Fort Collins, Colorado 80523; (303) 484-8777.

0045 Researchers Develop Automated Surface Irrigation System

Department of Agriculture, Washington, DC.

Nov 83 (D)

An electronic microprocessor-based controller that can automatically change the sets on a surface irrigation system has been developed. Using the same Touch Tone telemetry system as is used in telephone communications, the new system can automatically activate the momentarily-energized type of pilot valves commonly used in automated

surface irrigation systems, and provide growers with efficient, low cost timer-controlled irrigations. The design of the new irrigation controller is such that the timing, programming and control functions are all concentrated into one versatile central controller so that the satellite field stations contain only the circuitry necessary to decode commands from the central controller and activate the irrigation valves. This design enables the central controller to be quite sophisticated since only one is needed for a given irrigation installation, while the number of individual satellite stations in the field can be expanded easily and at nominal cost.

FOR ADDITIONAL INFORMATION: Contact: Allan Humpherys or Herbert Fisher, USDA-ARS, Snake River Conservation Research Center, Route 1, Box 186, Kimberly, Idaho 83341; (208) 423-5585.

0046 Trawl Efficiency Device

Department of Commerce, Washington, DC.

Jul 83 (D, C)

A Turtle Excluder Device (TED) has been developed. It is a passive mechanical sorter that is inserted in the body of a shrimp trawl. When the moving trawl scoops up mixed shrimp, fish and trash, the device diverts turtles to an escape route while retaining the shrimp. The device is 97 percent effective in saving endangered sea turtles. More recently the device is being termed a Trawl Efficiency Device because of its ability to strain out and reject not just turtles but large fish, sponges, rocks and other unwanted bycatch. This provides a cleaner catch of fish and shrimp from which to cull the shrimp. Large fish are released alive as a conservation measure. Cleaner catches result in reduced trawl drag relating to a higher fuel efficiency for the towing vessel. Cleaner catches also improve water flow through the trawl resulting in slightly better shrimp catch rates.

FOR ADDITIONAL INFORMATION: Contact: Mr. Wilbur Seidel, Mississippi Laboratories, Southeast Fisheries Center, NOAA, P.O. Drawer 1207, Pascagoula, Mississippi 39567; (601) 688-4252.

0047 Vegetation Index: A tool derived from satellite data for agricultural and land use surveys

Department of Commerce, Washington, DC.

Jul 83 (D, C)

The Vegetation Index, a satellite-derived indicator of the density, vigor, and greenness of vegetation has been developed. It is computed using data from two channels of the Advanced Very High Resolution Radiometer in NOAA polar orbiting satellites. The Index has the potential to assist state and local governments and private industry in inventorying agricultural resources, in land use studies and in monitoring land use changes.

FOR ADDITIONAL INFORMATION: For information on the scientific and technical aspects of the Vegetation Index contact: Dr. Dan Tarpley, NESDIS Satellite Applications Laboratory World Weather Building Washington, D.C. 20233, (301) 763-8282.

0048 Wind-Powered Pumping for Low-Lift Irrigation: System effectively performs low-lift irrigation to conserve energy and water

Department of Energy, Washington, DC.

Sep 83 (D)

Because energy for lifting and distributing water on Great Plains farms accounts for roughly 2.1 and 3.7 percent, respectively, of irrigation energy use, a cost-effective wind-powered system would replace conventional energy

sources and also encourage new system installations in critical water-supply areas, as well as in areas having no electrical service. A wind-turbine and pump-demonstration project and subsequent computer-simulation studies have proved the feasibility of a wind-powered system for low-lift irrigation pumping. During this evaluation, significant design parameters and system guidelines emerged for determining the various size combinations of wind turbines, pumps, tail-water pits, and temporary-storage reservoirs for the successful application of wind-powered tail-water pumping systems.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-016270, price code: A04 or for information not in the report, contact Darrell Dodge, Rockwell International, Wind Systems, Golden, CO 80402; (303)497-7174.

ATMOSPHERIC & ASTRONOMICAL SCIENCES

0049 Mapping Ocean Winds by Radar: Algorithm recovers data on windspeed, wind direction, and wind patterns from radar returns

National Aeronautics and Space Administration, Washington, DC.

Apr 83 (J)

Information about ocean weather can be extracted from radar returns with the aid of a special algorithm. Originally developed for use with data obtained by microwave radar on the Seasat satellite, the algorithm can determine wind-speeds and wind directions at the ocean surface and from this information can locate low-and high-pressure centers, convergence regions, and zones of strong winds and wind shear associated with ocean weather-system fronts. Although the specific method for generating weather parameters is probably limited to processing weather-satellite data, the general techniques will be of interest to those involved in radar signal analysis in other applications.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div., P.O. Box 8757, BWI Airport, MD 21240. Refer to NPO-15267/TN.

0050 Radionuclide Counting Technique Measures Wind Velocity: The change in position of a radioactive source translates into wind-velocity measurement

National Aeronautics and Space Administration, Washington, DC.

Dec 83 (J, K)

A proposed technique for measuring wind velocity is based on the inverse-square-law variation of radioactive counting rates. In the proposal, a radioactive source is deposited on the bottom of a light, hollow sphere, such as a plastic table-tennis ball, and suspended by a flexible wire over a radiation counter. The ball can be punctured with symmetrically distributed holes or otherwise roughened for aerodynamic stability. If the source position is changed because of wind drag on the ball, the solid angle subtended by the counter decreases, and the counting rate is reduced. A graph of counting rate as a function of source position would be used to determine the source position and the wind drag on the ball. An anemometer based on this concept would be self-contained, portable, yet not too fragile. It could be used for extended periods of time, even at remote, inhospitable, and inaccessible sites.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: NASA-TM-83202, price code: A02.

BIOMEDICAL TECHNOLOGY & HUMAN FACTORS

0051 Alloy May Improve Durability of Dental Implants

National Institutes of Health, Bethesda, MD.

Aug 83 (E, H)

A porous metal implant designed to support removable dentures and fixed bridges and to replace missing teeth proved successful in tests on monkeys at the University of Washington Regional Primate Research Center (PRC) in Seattle and at the Pacific Northwest Laboratories of the Battelle Memorial Institute in Richland, Washington. The titanium-aluminum-vanadium alloy is shaped into a cylindrical honeycomb that lets bone grow into its base. Bone intertwines with the implant to retain it in the jaw.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB83-925508, price code E02.

0052 Chemical Protective Clothing: Improvements are being made in chemical protective overgarments

Army Materiel Development and Readiness Command, Alexandria, VA.

Jun 83 (H)

The chemical protective clothing as it exists today consists of a chemical and biological protective mask, a butyl-rubber-coated fabric hood, butyl-rubber handwear and footwear, and a two-piece overgarment composed of a nylon/cotton fabric and a polyurethane foam layer impregnated with activated carbon backed with nylon. Since the adoption of the new clothing system, the U.S. Army Natick Research and Development Laboratories have been conducting studies to improve the overall properties of the clothing components. Three areas of active experimental investigations in this direction are identified: (1) the flame hardening of over-garments; (2) methods of utilizing active carbon, active carbon fibers, active carbon fabrics, and hollow fibers as sorptive materials; (3) the use of improved elastomers, such as rubber called phosphasene, for the protection of extremities.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A090402, price code: A02.

0053 Computer Helps Dentists See Three-Dimensional Images of the Teeth

National Institutes of Health, Bethesda, MD.

Oct 83 (C)

The use of a computer permits three-dimensional images of teeth to be produced from as few as eight x-ray images made from different angles. Each image requires very little radiation so that the total dose to the patient is comparable to that required by conventional methods using one small film packet. These images appear as successive layers sliced through the tissue so that a dentist can see in three dimensions important clinical details impossible to visualize with conventional x-ray systems.

FOR ADDITIONAL INFORMATION: Contact: NIH News Branch, Building 31, Room 2B-10, Bethesda, MD 20205, (301) 496-2535.

0054 Computerized Biomedical Man-Model

Department of the Air Force, Washington, DC.

Dec 83 (A, E)

The Computerized Biomedical MAN-model (COMBIMAN) is a computer interactive graphics technique for workplace design. This model allows a designer, sitting at a CRT, to manipulate a three-dimensional human operator of variable size and proportions and to design a workplace around it, to evaluate the fit accommodation, the reach accommodation, and the field-of-vision accommodation. While originally intended for the design and evaluation of aircraft cockpits, the general format of the model is suitable for evaluation of any seated workplace, including theoretical and conceptual designs. The COMBIMAN is a computer generated mock-up. The designer need enter only pertinent aspects of the workplace. The designer may enter the dimensions of a known individual, or use one of the built-in algorithms to dimension the man-model from statistical description of men and women anthropometric surveys. These algorithms allow the designer to perform complex anthropometric analyses without having to deal with the raw data. The program was developed on IBM type vector graphics equipment, and this or equivalent equipment is required to use the program. The Visibility analysis program, developed as part of the COMBIMAN, is now available as a separate, stand-alone program. This is a standard FORTRAN program and requires only a graphics plotter.

FOR ADDITIONAL INFORMATION: Contact: Dr. Joe W. McDaniel, AFAMRL/HEG, Wright-Patterson AFB, OH 45459, (513) 255-5779.

Displaying Helicopter Engine Data: Programmable model shows how pilots' jobs can be made easier

See 0008

0055 Efficient Flow-Control Valve for Oxygen Therapy: Laminar-flow fluidic device can save a patient hundreds of dollars a year in oxygen costs

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 (D, E)

Researchers at the U.S. Army Electronics Research and Development Command have developed an intermittent-demand valve for oxygen therapy. The valve is operated by laminar-flow fluidic logic, which has power consumption about 3 orders of magnitude less than that of conventional turbulent-flow fluidic logic, has low noise, and an extremely low operating threshold. The valve consists of a laminar proportional amplifier (LPA), a laminar flip-flop, a diaphragm flow valve, a bias-control valve, and two pressure regulators. This valve remains at its open position as long as the patient is inhaling. A savings of oxygen of between 10 and 37 percent is possible.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A084083, price code: A02 or contact project officer George Mon (202) 394-1551.

0056 Electrostatic Properties of Flameproof Garments: Protective clothing made of a new material is comparable to flameproof cotton in the propensity to generate electrostatic charges

Army Materiel Development and Readiness Command, Alexandria, VA.

Apr 83 (H)

Garments worn by explosive handlers have a tendency to accumulate high electrostatic voltages depending on garment material, type of shoes worn, humidity, temperatures, and the composition of flooring. Garments made of flameproof cotton were compared with garments made of materials woven from Nomex, or equivalent, with 1 percent metal fibers. Results have shown that the material with metal fibers was comparable to flameproof cotton in propensity to generate static charges.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A092347, price code: A03 or contact Project officer John F. Van Savage (201) 328-2295.

0057 Evaluating Footwear for Cold Regions: Test procedures are suggested for determining performance under actual-use conditions

Army Materiel Development and Readiness Command, Alexandria, VA.

Aug 83 (E, K)

A document discusses methods for the environmental testing of boots and similar footwear commonly worn in cold regions. Prepared for the U.S. Army Test and Evaluation Command, the document covers procedures for evaluating the footwear's functional suitability, its compatibility with arctic clothing and equipment operation, and its durability, maintainability, and safety. Facility and instrumentation requirements for conducting such tests are given. Checklists and evaluation formats are included to assist test personnel.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A087116, price code: A03.

Expert Computer Program Overhauled

See 0783

0058 Flame-Resistant Overgarment: Fit, comfort, and suitability for working environment are evaluated

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (E, H)

An improved protective overgarment developed for the U.S. Army Human Engineering Laboratory, resists high-intensity flames and hazardous chemical agents. The improved suit was compared with a conventional chemical/biological protective overgarment and found to be quite compatible with it in terms of comfort and protective quality. The new suit consists of two layers, an inner lining and an outer shell. The lining is made of cloth laminated with tricot-knit nylon and polyurethane foam impregnated and treated for flame resistance. The outer shell is made of 95 percent Kevlar, or equivalent, and 5 percent Nomex, or equivalent.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A111318, price

code: A03 or contact project officer Richard S. Bruno (301) 278-2170.

0059 Implantable Drug Dispenser: Differential vapor pressure allows fine control

National Aeronautics and Space Administration, Washington, DC.

Jun 83 (E)

Drugs such as insulin would be injected as needed directly into the bloodstream by a compact implantable dispensing unit. The dispenser uses counteracting vapor pressures on opposite sides of a diaphragm to control the rate at which the drug is administered. Previous designs use liquids as the pressure media, but they require a larger volume than the vapor-pressure device to dispense the same amount of drug. In the proposed device heaters regulate the vapor pressures that force the drug into the bloodstream. A dispensing device of implantable size could hold a 30-day supply of insulin to be dispensed at a rate of 1 cu cm per day.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15160.

0060 Improved Gloves for Firefighters: New materials and constructions give better protection

National Aeronautics and Space Administration, Washington, DC.

Oct 83 (E, H)

New firefighter's gloves are more flexible and more comfortable than previous designs. Since some firefighters prefer gloves made of composite materials while others prefer dip-coated gloves, both types were developed. The new gloves may also find uses in foundries, steelmills, and other plants where they can be substituted for asbestos gloves. An aramid fabric was selected as the material for the outer shell of the composite glove because it is strong and resistant to flame and heat.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Division, P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100 or contact Patent Counsel, Johnson Space Center, Mail Code AL-3, Houston, TX 77058; (703) 483-4871. Refer to MSC-20261.

0061 Integrated Protection Clothing: Convenience, comfort, and fit are assessed

Army Materiel Development and Readiness Command, Alexandria, VA.

Mar 83 (E)

An evaluation of clothing to protect combat vehicle crew members from a variety of hazards is described in a report prepared by the U.S. Army Human Engineering Laboratory. The ease of body extraction, fit, sizing, and the general compatibility of combat-vehicle crewmember clothing system (CVCCS) were the basis for the evaluation. Various uniform and equipment combinations were worn in accordance with standards for the layered-clothing principle employed by the Army. Uniform ensembles worn in evaluation were designed for climates ranging from hot to very cold. The uniforms included standard underwear and socks. The chemical/biological protective clothing worn over the uniforms consisted of suit, footwear covers, and gloves.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A092669, price code: A02.

0062 Laser Surgery Mends Nerves

National Institutes of Health, Bethesda, MD.

Apr 83 (E)

A laser beam coagulates red blood cells encircling the ends of a severed nerve, forming an adherent sleeve of tissue that holds the two ends together. Within this sleeve, new nerve fibers from the ends grow together. Whether laser repair of the damaged nerve will produce better results than suturing the nerve ends together is not known. The technique has just recently been applied to humans.

FOR ADDITIONAL INFORMATION: Contact: Dr. Edward Almquist, Seattle Hand Surgery Group, Suite 70, 801 Broadway, Seattle, WA 98122; (206) 292-6252.

0063 Low-Noise Implantable Electrode: A pocket configuration isolates the electrode/electrolyte interface from body tissue

National Aeronautics and Space Administration, Washington, DC.

Mar 83 (E)

A new implantable electrocardiogram electrode is much less sensitive than previous designs to spurious biological potentials. Designed in a novel 'pocket' configuration, the new electrode is intended as a sensor for the radiotelemetry of biological parameters in experiments on unrestrained subjects. The key element in the electrode is an electrically conductive pocket with a large mouth that permits the influx of conductive body fluid so that electrical current can reach the inner pocket surface. The loop electrode generated more artifacts, by at least an order of magnitude, than the disk electrode.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Division, P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: ARC-11258/TN. Inquiries concerning rights for the commercial use of this invention should be addressed to: Patent Counsel, Ames Research Center, Mail Code: 200-11A, Moffett Field, CA 94035. Refer to ARC-11258/TN.

Measuring Formaldehyde Concentration in Indoor Air: Impregnated filters and test atmospheres for calibration make monitoring possible at parts per billion

See 0462

0064 Moving-Surface Follower Aids Microsurgery:

Surgical implements are precisely positioned in moving tissue

National Aeronautics and Space Administration, Washington, DC.

Feb 83 (E)

A novel manipulator follows the movements of arteries and muscles, enabling precise placement of a probe or other microsurgical tool in the moving tissue. The microprobe assembly is mounted on the output of the pneumatic servo of a commercial noncontacting thickness gage. Pulsations of the tissue surface to be penetrated by the probe are sensed by the gage and followed by the servo, eliminating relative motion between the tissue and the probe.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div, P.O. Box 8757, BWI Airport, MD 21240. Refer to NPO-15197/TN.

0065 New Device Causes Minimal Damage to Nerve Tissue When Injecting Tracer Compounds

Department of Health and Human Services, Washington, DC.

Nov 83 (E, K)

The device can deliver small amounts of tracer compounds to specific targets in the brain. It minimizes diffusion of the tracer and the unintentional labeling of cell bodies and terminal systems of injured axons passing through the injection site--problems that often occur when tracers are injected with conventional syringes. These considerations are especially crucial in neurobiological research on animals with small brains and on newborn or fetal animals. The injection device, a closed, bubble-free hydraulic system, can inject as little as 10 nanoliters of trace compounds through micropipettes with tip sizes as small as 10 micrometers.

FOR ADDITIONAL INFORMATION: Contact: Dr. Michael P. Shipley, University of Cincinnati, College of Medicine.

0066 Onboard Oxygen Generation System

Department of the Air Force, Washington, DC.

Dec 83 (D, E)

Onboard, inflight generation of aviator's breathing oxygen is rapidly maturing technology, to replace stored supplies of liquid or gaseous oxygen in military aircraft. The concept of OBOGS eliminates the logistics chain required for frequent aircraft servicing. In addition to material savings, OBOGS offers operational advantages in austere aircraft basing, faster ground turnaround, improved systems safety and, in some missions, removal of constraints in flying duration. Oxygen enrichment of air via pressure swing adsorption zeolite (molecular sieve) particles is one of several inflight oxygen generations systems in test by all three military services for application in tactical aircraft. Molecular sieves concentrate oxygen from engine bleed air by selective adsorption of nitrogen and other compounds based on molecular size and polarity. This technology could be used to supplement oxygen in small jet and commercial type aircraft, although presently it would not be cost effective. OBOGS is also being evaluated by the Air Force and Army to provide emergency oxygen to bedside patients in front-line hospitals. The method would eliminate oxygen cylinders.

FOR ADDITIONAL INFORMATION: Contact: Dr. Richard L. Miler, USAF School of Aerospace Medicine/VNL, Brooks AFB, TX 78235, (512) 536-3361.

0067 Peritoneal Drug Delivery for Special Diabetics

National Institutes of Health, Bethesda, MD.

Apr 83 (E)

A new system for delivering insulin directly into the peritoneal cavity has eliminated recurrent and sometimes life-threatening infections caused by administering the drug through intravenous catheters, an unusual route of administration reserved for diabetics who do not respond to conventional injections of the drug. The system consists of a dacron and silicon port implanted near the umbilicus and sealed by the body's own skin. It does not intrude into the circulatory system, it is completely sealed from external bacteria, and the insulin is self-sterilizing.

FOR ADDITIONAL INFORMATION: See the journal, 'Diabetics' 31:470-473, 1982.

0068 Reaching High Bookshelves From a Wheelchair: A simple mechanical device extends a user's reach

National Aeronautics and Space Administration, Washington, DC.

Jan 83 (E, F)

A 'book retriever' developed at Goddard Space Flight Center allows people confined to wheelchairs to remove or replace books from the upper shelves of library stacks. The retriever is a mechanical device composed of an aluminum tube approximately 5 feet long with two jaws at the upper end. The jaws securely clamp a selected book; they are thin enough that they can be inserted between adjacent books. The user actuates the jaws by rotating a crank near the lower end of the tube. The user does not have to support the full weight of a book.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer, P.O. Box 8757, BWI Airport, MD 21240. Refer to GSC-12772.

Regulating Oxygen Pressure Safety: Sudden heating is avoided when the regulator is turned on

See 0619

0069 Spine Immobilizer for Accident Victims: A conformal bladder would safely blanket immobilize, and restrain spine injury victims

National Aeronautics and Space Administration, Washington, DC.

Jul 83 (E)

In spite of advances in methods and appliances for the protection of the cord in spinal injuries, many victims who are able to move their extremities shortly after an accident receive irreparable damage to the spinal cord during transport from the scene of the accident to a hospital. A proposed conformal bladder, which is filled with tiny spheres called microballoons, would enable the spine of an accident victim to be rapidly immobilized and restrained and permit the victim to be safely removed from the accident scene in an extremely short time after help arrives. The microballoons expand to form a rigid mass when the pressure within the bladder is less than ambient.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: ARC-11167.

0070 Starch-Based Membranes Separate Large, Small Molecules In Dialysis

Department of Agriculture, Washington, DC.

Dec 83 (H, J)

Membranes made with starch from cereal grains or potatoes can be used as filters to separate large and small molecules in a process called dialysis. It was determined that large molecules of substances in solution pass through the starch-based membranes slowly or not at all, and small molecules go through faster. Researchers have found a way to make these first starch-based, semipermeable membranes in studies of biodegradable starch films. Starch-based membranes can be tailored for specific permeability characteristics by adjusting the proportions of starch and a polymer of ethylene and acrylic acid. Semipermeable membranes can be made with starch-to-polymer ratios from 20:80 to 60:40.

FOR ADDITIONAL INFORMATION: Contact: Felix H. Otey, Agricultural Research Center, U.S. Department of Agriculture, North Central Region, 20000 W. Pioneer Parkway, Peoria, IL 61615, (309) 685-4011, Ext. 377.

0071 A White-Light Pseudocolor Encoder For Diagnostic Imaging

Department of the Army, Washington, DC.

Dec 83 (B, K)

A prototype inexpensive analog optical pseudocolor encoder utilizing white-light processing has been developed for applications in diagnostic imaging. The system is capable of handling very large information elements and has a high signal to noise ratio. It may be useful as a relatively economical means for transforming gray-scale images into color coded images. Color coding may be beneficial in achieving better diagnostic accuracy because it is believed that the human eye can differentiate considerably more colors than gray shades. The method has been verified both mathematically and experimentally. This method is applicable to gray-scale images obtained by such diagnostic imaging modalities as conventional x-ray, ultrasonography, radionuclide imaging, etc.

FOR ADDITIONAL INFORMATION: Contact: US Army Missile Command, Attn: DRSMI-RN (L. Goodman) Redstone Arsenal, AL 35898; (205) 876-4684. Refer to RN-1/TN.

BUILDING INDUSTRY TECHNOLOGY

0072 Daylighting Model Provides Key Design Strategies for Commercial Buildings

Department of Energy, Washington, DC.

Jun 83 (C, D)

Researchers in SERI's Daylighting Laboratory have formulated an illuminance model that facilitates the integration of daylighting in commercial building design. The model has been well received by architects, mechanical engineers, and lighting design engineers. The model can be applied both to the new or retrofit design of a building and to the associated electric lighting control system.

FOR ADDITIONAL INFORMATION: Contact: Claude Robbins, Buildings Systems Research Branch, Solar Energy Research, Inst., Golden, CO; (303)231-7060.

0073 Energy Management Handbooks for Buildings: Comprehensive handbooks describe how, why, and where to save energy in buildings

Department of Energy, Washington, DC.

Mar 83 (C, D)

Two handbooks offer a comprehensive information package on energy savings in buildings. The first handbook, published for operating engineers, provides the information needed to set up and maintain energy management in existing buildings. Detailed guidance is given on conducting an energy survey. Guidelines for energy conservation are illustrated by examples. The second handbook, for instructors, contains identical information. However, it includes additional material on instructional objectives and instructional aids..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order numbers: DOE/CS/10315-T1 and DOE/CS/10315-T2; price codes: A21 and A22.

Fragmentation Characteristics of Dividing Walls: Masonry block walls do not fragment as drastically as reinforced-concrete walls

See 0135

0074 Hangar Heating Conservation II: Flexible Vinyl Strip Doors

Department of the Navy, Washington, DC.

Sep 83 (C, D)

Tests have demonstrated that flexible vinyl strip doors can decrease heat loss and increase comfort in large buildings with open exterior doors such as hangars and warehouses. The results of tests on the air leakage characteristics of flexible vinyl strip doors have been determined. The energy savings obtained by using flexible vinyl strip doors is a function of the reduced rate of air leakage, the length of time a door remains open, the inside/outside temperature difference, and heating system efficiency..

FOR ADDITIONAL INFORMATION: Contact: J. L. Ashley, Naval Civil Engineering Lab, Point Hueneme, CA 93043; (805) 982-5085.

0075 Heat and Pressure Seal for Doors: Refractory fibers provide resilience

National Aeronautics and Space Administration, Washington, DC.

Feb 83 (H)

A proposed tubular gasket for doors performs a dual function: It seals in pressure, and it seals out heat. Composed of a quartz fabric filled with alumina matting, the gasket is bonded with a room-temperature-vulcanizing material to the periphery of the door. When the door is closed, the gasket is compressed like an O-ring so that it fills the gap between the door and the frame and prevents leakage of air and heat. The gasket may be suitable for spacecraft and commercial aircraft. It may find automotive applications too, for example, as an exhaust manifold closure when a car is converted from a V-eight to a V-four engine.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB83-925802, price code E02.

0076 Heat-Pump Community Energy Systems: Entire districts can be heated and cooled in an economically attractive, environmentally acceptable way

Department of Energy, Washington, DC.

Mar 83 (C)

Two reports assess the possibility of developing heat-pump-centered integrated community energy systems (HP-ICES) that would heat and possibly cool entire districts. They examine this technology in depth, drawing on a number of individual studies conducted by private contractors. Centralized, distributed, and cascaded HP-ICES arrangements are examined and assessed as to advantages and disadvantages inherent in each. Costs and environmental impacts are included in the study. The HP-ICES can do more than district heating and cooling: They can also provide centralized refrigeration and hot water.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: ANL/CNSV-7, price code: A07 or for information not in the report, contact Milt Shackelford, Argonne National Laboratory, 9700 South Cass Avenue, Argonne, IL 60439; Telephone (312) 972-5246.

0077 Heat-Pump Water Heater: Latest designs offer considerable energy savings and short payback periods

Department of Energy, Washington, DC.
Feb 83 (C)

Research, development, and demonstration efforts have produced a marketable heat-pump water heater (HPWH). This water heater is more expensive to purchase than electric-resistance water heaters, yet uses only one-half to one-third of the electricity. The HPWH works similarly to an air-conditioner with one major modification. Heat from the surrounding air, absorbed by the refrigerant, is utilized to heat the water. A large potential market is anticipated from single-family homes, particularly in suburban and rural areas and in areas where the cost of electricity is high.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report order number: ORNL/Sub-7321/1, price code: A05.

Integrating Resource Recovery and District Heating Development for Urban Energy Systems

See 0347

Low-Cost Electrically-Heated Glass Panels: Simple process converts reflective glass into electrically heated panels

See 0353

Measuring Radon Levels Indoors: Techniques are suggested and study results are reported

See 0857

NASTRAN(R): April 1982 Release

See 0893

0078 New Computer Program Helps Pick Solar, Energy-Saving Strategies

Department of Commerce, Washington, DC.
Aug 83 (A, C, D)

National Bureau of Standards researchers have developed a computer program which will help building designers select the most economical mix of solar and other energy-conserving strategies for new commercial buildings with active solar space and water heating equipment. The SOLCOM program analyzes the complete life-cycle cost for the active solar system and for each envelope and plant modification to be considered; also included are tax and mortgage effects. It then determines the optimal strategy for investing in energy-conserving systems. While the SOLCOM program provides a technically sound basis for using a microcomputer to help make complex economic decisions, it is still experimental and some improvements may be needed to make the program more user-oriented.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB83-182295, price code: A07.

0079 New NBS Fiberboard Insulation Standard Reference Material Includes Low Temperature Data

National Bureau of Standards, Washington, DC.
Feb 83 (D, H)

A new Fiberboard insulation Standard Reference Material (SRM) is now available. In addition to certified thermal resistance (R) values for ambient temperatures, OF to 135F, the certificated contains informational data for temperatures in the cryogenic range, down to 261F. Though the low temperature data is not sufficient for NBS certifica-

tion because only a single density was measured, it will help manufacturers and others in calibrating equipment used to produce fiberboard insulation of containers for transporting and storing cryogenic fluids (e.g., liquefied natural gas and nitrogen). The SRM is two feet square and one inch thick.

FOR ADDITIONAL INFORMATION: When ordering, specify SRM No. 1450B. The price is \$355. Address written orders to the Office of Standard Reference Materials, Chemistry Building B311, National Bureau of Standards, Washington, D.C. 20234; (303) 921-2045.

0080 Onsite Fabrication of Trusses and Structures: Reinforced-plastic members are fabricated and assembled into trusses for structures at remote or inaccessible locations

National Aeronautics and Space Administration,
Washington, DC.

Jan 83 (D, G)

The technology for automatically fabricating structural beams, joining them to one another or to other parts to make rigid structures, and mounting equipment on them has been worked out in detail. Although originally conceived for assembling large structures in space, the proposed techniques could also be applied in remote, cramped, or otherwise-inaccessible terrestrial situations. The structural beams are triangular trusses made from three longitudinal members called caps, held together by crossmembers and braced by diagonal cords. The joints are made by an ultrasonic-welding process that requires no other parts or adhesives.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: NASA-CR-160345, price code: A03.

0081 Passive Cooling and Heating With Heat Pipes: Systems require no active controls or human intervention

Department of Energy, Washington, DC.

Sep 83 (C, D)

New passive systems for the solar heating and cooling of residences use heat pipes. Consisting of a metal tube with an inner lining of wicklike material and a small amount of fluid in a partial vacuum, a heat pipe absorbs heat at one end by the vaporization of the fluid and releases the heat at the other end by the condensation of the vapor. In the heating system, heat pipes absorb heat from a solar plate, which in turn absorbs heat from sunlight and releases heat to a heat-storage wall. The wall gradually releases heat to adjacent living space, even at night. In the cooling system, the working fluid circulates through a dissipator, a reservoir, and up and down the heat pipes.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,280,333 which is available from Commissioner of Patents, Washington, DC 20231 for \$1. For licensing information, contact Office of Assistant General Counsel for Patents, U.S. DOE, Washington, DC 20585.

Pavement Patching Research Is Compiled and Released

See 0139

0082 Pipe Heat Transfer Calculation

Department of Commerce, Washington, DC.

May 83 (C, D)

Underground heat distribution systems for a complex of buildings have been widely used in the United States for the past several decades. Only recently underground chilled water distribution systems began to gain popular acceptance. The economic consideration as to whether the chilled water pipes should be insulated or not has required a careful reevaluation of the heat transfer problem. A series of computer programs have been developed to determine heat transfer of multiple pipe systems as well as to evaluate economics of underground heat distribution systems. The system is written in the FORTRAN V programming language for implementation on a UNIVAC 1108 or GE 400 computer using the EXEC 2 & 8 or GSA operating system. The computer memory requirement is 32K.

FOR ADDITIONAL INFORMATION: Contact: Computer Products, Room 1006, NTIS, Springfield, VA 22161. Refer to PB83-108993.

**0083 Production of Impact-Resistant Plastic Windows:
At half the weight, polyolefin panels the same
protection as polycarbonate panels**

Army Materiel Development and Readiness Command,
Alexandria, VA.

Dec 83 (G, H)

Optimum processing conditions have been developed for molding and laminating oriented polyolefin film into impact-resistant windows. The work was conducted for the U.S. Army Materials and Mechanics Research Center. In addition to providing high impact resistance, the produced laminates have shown sufficient adhesion to resist debonding during thermal cycling. The tensile strength of polyolefin film is increased from 4,800 to 33,000 psi in an oriented direction when the film is compression rolled to 4.5 its original length. Since the tensile strength in the direction transverse to the machine orientation is slightly reduced, from 4,800 to 4,600 psi high impact resistance is obtained by cross-plying successive layers of the film at 90 degrees. A protective cover is required to shield the laminate from abrasion and ultraviolet radiation.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A107562, price code: A03 or contact project officer Anthony Alesi (617) 923-3100.

**0084 Researchers Develop Computer Program To Study
Thermal Performance**

Department of Commerce, Washington, DC.

Nov 83 (A, D)

A computer program has been developed by the National Bureau of Standards to help researchers study in detail the simultaneous movement of air, heat, and moisture in and through multi-room buildings. The majority of computer programs that simulate building thermal performance can consider movement only in a single room. Written in FORTRAN 77, the Thermal Analysis Research Program (TARP) is intended to be used by those who are familiar with energy analysis programs and methods. TARP uses the detailed heat balance method for the simultaneous calculation of the energy requirements of multiple rooms. Inter-room conductive and convective process are simulated in detail. A program reference manual is available which describes the algorithms, input, output, and program structure of TARP. The Program is written to be portable and modifiable. It runs on CDC and UNIVC computers.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB83-194225, price code: A13.

**0085 Retrofitting Passive Solar Heating: A sourcebook
offers advice for individual, community, and
governmental action**

Department of Energy, Washington, DC.

Sep 83 (C)

A source book, 'Starting a Local Conservation and Passive Retrofit Program,' is intended to assist community planners, government officials, neighborhood officials, neighborhood groups, and others in establishing a local program to improve the energy efficiency of existing buildings. The book examines the potential of conservation and passive solar technologies for reducing the space-heating requirements of single-family residences, mobile homes, multifamily buildings, and nonresidential buildings. Techniques for determining current energy consumption and the potential savings from conservation and passive solar improvements are presented. Included are lists of references, organizations, and programs that are already operating in communities..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-014132, price code: A15 or for information not in the report, contact J. Fred Roach, Los Alamos National Laboratory, MS F605, Los Alamos, NM 87545.

**Signal Conditioner for Gas Alarms: Alarm-system
capability is expanded to a variety of gases**

See 0492

**Solar Air Heating with Auxiliary Heat Pump: A state-of-
the-art system has been built and operated**

See 0379

**Storing Winter Ice for Summer Air-Conditioning: This
system uses no external energy source to make and
store ice**

See 0387

**Structural Analysis of Shells: Program includes stress,
buckling, vibration, and transient analysis of
multisegment shells**

See 0900

**0086 Three-Dimensional Air Curtains: Gas flow would
partition a large volume into separate spaces**

National Aeronautics and Space Administration,
Washington, DC.

Feb 83 (D)

A proposed scheme for gas 'curtains' would partition a large volume into several separate spaces. The concept may be useful in such applications as unobtrusive isolation of smoking and nonsmoking sections in restaurants and offices. In general, the scheme is suitable for the isolation of objectionable or hazardous gases in a free space.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and a diagram is available by ordering the monthly sub-

CHEMISTRY

scription package, order number PB83-925402, price code E02.

Transparent Solar-Energy Assembly: Economical space-heating assembly collects solar heat and admits light into the house

See 0392

CHEMISTRY

0087 Accelerated Corrosion Test for Antifreeze

Compounds: Suitability of compounds is determined with minimum time and expense

Army Materiel Development and Readiness Command, Alexandria, VA.

Dec 83 (H, K)

A report describes an accelerated test for screening antifreeze compounds. The new test eliminates costly and time-consuming simulated service test. The accelerated test, which was developed by the U.S. Army Mobility Equipment Research and Development Command, gives a good indication of solder corrosion, which is one of the most serious offenders in today's cooling systems. The accelerated-test apparatus consists of a brass bomb containing a 33 1/3 percent antifreeze solution in ASTM corrosion water. The bomb is heated to 200F while a 10-mA dc passes through a cathode and anode in the bomb. A magnetic stirrer circulates the antifreeze solution. The cathode is a cast-ion plate. The anode is an assembly of five metal coupons, each a different metal: copper, steel, brass, aluminum, or solder. The test indicates which antifreeze compounds are so corrosive as to be barred from further testing. About half the compounds tested so far fall into this category. The test thus avoids the expense and delay of more detailed testing of unsuitable compounds.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number AD-A114683, price code: A02 or contact project officer Robert Jamison (703) 664-4325.

Acoustic Instrumentation for Coal-Conversion Plants:

Acoustic instruments are nonintrusive and respond rapidly

See 0425

0088 Acoustic Methods Remove Bubbles From Liquids:

Sonic oscillation increases the surface area of bubbles and causes them to dissipate

National Aeronautics and Space Administration, Washington, DC.

Dec 83 (D, J)

Two acoustic methods can be applied to molten glass or other viscous liquids to remove bubbles. Bubbles are either absorbed or brought to the surface by applying a high-intensity sonic field at a resonant frequency. In one method, a swept frequency resonant to bubbles of various sizes is used; and in the second, several resonant modes in an acoustic chamber are applied. The methods could be applied to the production of molds and optical-quality glass.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15334.

0089 Aluminum Phosphate Crystals for Acoustic Devices: A hydrothermal system permits visual observation of the crystal-growth process

Army Materiel Development and Readiness Command, Alexandria, VA.

Jul 83 (H, J)

Large, high-optical quality, single crystals of aluminum phosphate were successfully grown, using a modified hydrothermal technique, in a project sponsored by the U.S. Army Electronics Research and Development Command. The aluminum phosphate, also known as berlinite, has recently emerged as a promising material for acoustic-wave devices because of its thermal stability and high electromechanical coupling characteristics. When compared to quartz and lithium niobate, the $AlPO_4$ devices would have lower insertion loss and would eliminate the need for ovens to stabilize the temperature.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A090359, price code: A02 or contact project officer Thomas R. Aucoin (201) 544-2452.

0090 Analysis of Yttrium in Silicon Nitride: Two quantitative methods for determining yttrium are described

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (H, J, K)

Two spectrographic techniques have been developed for the quantitative analysis of yttrium in high-strength silicon nitride densified with yttria. The techniques were developed for the U.S. Army Materials and Mechanics Research Center. The first technique is emission spectroscopy that compares the spectra recorded on photographic plates from dissolved samples to those of aqueous standards. The second method uses energy-dispersive X-ray fluorescence spectroscopy for a comparison of spectra obtained from fusion buttons made with test samples with those made from pure yttria and undensified silicon nitride.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A107596, price code: A02.

Analyzing Paint for Lead Content: New method is fast and convenient

See 0656

Automatic Flushing Unit With Cleanliness Monitor:

Particle content of flushing solution is measured continuously

See 0428

Biological Detector and Warning System: The system, consisting of an alarm and a sampler, could prove useful in atmospheric-pollution studies

See 0431

0091 Bipulsating Technique for Silicon Production:

Method controls reaction temperature and rate of reaction of sodium and silicon tetrafluoride

National Aeronautics and Space Administration, Washington, DC.

Jun 83 (G, H)

The reduction of silicon tetrafluoride by sodium, to produce high-purity silicon, is very fast and highly exothermic. It

begins at temperatures around 150 to 200 C and the temperature can reach more than 2,000 C. A new proposal suggests that the temperature and rate of reaction can be regulated by alternately adding measured amounts of the reactants. This technique could be used in a large reactor, where heat dissipation becomes a serious problem, to control reactor temperatures. It would be a highly efficient method, which would utilize almost 100 percent of the raw materials.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15367/TN.

0092 Calibrating Technique for Molecular Beam Sampling for Mass Spectroscopy

Department of Navy, Washington, DC.

Feb 83 (J, K)

Molecular beam sampling as applied to mass spectroscopy is an extensively used analytical technique to determine concentration of specific elements in a specific setting such as impurities in semiconductor manufacture or determining specific compounds in organic chemistry. The Office of Naval Research has announced an invention wherein use of a calibrated gas mixture containing traces of heavy gas molecules in light gas matrix provides increased sensitivity in molecular beam sampling for mass spectroscopy.

FOR ADDITIONAL INFORMATION: Contact: Navy Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, VA 22448. Refer to No. 070902.

0093 Chelating Agent Assay: Method improves analysis of corrosion-removing compounds

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (J, K)

An analytical procedure was developed for determining the concentration of the trisodium salt of N-hydroxyethylenediamine triacetic acid (3Na-EDTAOH) in metal-conditioning compounds. The assay was developed for the U.S. Army Mobility Equipment Research and Development Command. Previous methods have been susceptible to interference from other chelating agents, making determination of inferior substitutes in the metal compounds difficult. The procedure involves adding erichrome black T, or equivalent, indicator to the pretreated sample and titrating with a zinc sulfate solution to a purple endpoint.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A110767, price code: A02.

0094 Chemical Feedstocks From Renewable Resources

Department of Energy, Washington, DC.

Dec 83 (C, G)

The assessment of the potential for production of commodity chemicals from renewable biomass resources is based on (1) a Delphi study that uses 50 recognized authorities to identify key technical issues relevant to production of chemicals from biomass and (2) a systems model based on linear programming for a commodity chemicals industry that uses renewable resources and coal, as well as gas and petroleum-derived resources. This technology was developed at the Oak Ridge National Laboratory. Use of the chemical industry model to evaluate process technologies is demonstrated. Processes are identified that have potential for significant added value to the system if process improvement can be made to improve the economics.

nificant added value to the system if process improvement can be made to improve the economics.

FOR ADDITIONAL INFORMATION: Contact: D.W. Jared, Oak Ridge National Laboratory, Box X, Oak Ridge, TN 37830; (615) 574-4192. Refer to 460/XTN.

Chemical Vapor Deposition of Germanium on Silicon: Interface stresses are reduced during both growth and cooling periods

See 0882

0095 Chemical Vapor Deposition of Niobium Germanide: Improved deposition produces strong bond between this superconductor and metal substrate

Department of Energy, Washington, DC.

Mar 83 (G, H, J)

An improved chemical-vapor-deposition technique produces a strong bond between niobium germanide (Nb₃Ge) and a metallic substrate. Among many possible superconducting applications this process is of interest in experimental work with superconducting dc power-transmission lines. Such lines are basically metal tubes made of copper, steel, or stainless steel that carry cryogenic coolant; e.g., liquid helium. The process involves the coreduction of NbCl₅ and GeO₄, by hydrogen gas on a hot metallic substrate.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,202,931, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1. For licensing information contact: Office of Assistant General Counsel for Patents, U.S. DOE, Washington, DC 20585.

Clear Film Protects Against Ultraviolet Radiation: Weather-resistant material is a copolymer of a screening agent and an acrylic resin

See 0667

0096 Closed-Loop Process Yields Ultrapure Silicon: Metallurgical-grade silicon is converted into semiconductor-grade silicon

National Aeronautics and Space Administration, Washington, DC.

Jun 83 (G, H)

A closed-loop process produces ultrapure silicon from metallurgical-grade silicon by forming, purifying, and hydrosilylating tribromosilane (HSiBr₃). The essence of the process involves manipulating the equilibrium of the chemical reaction $\text{HSiBr}_3 + \text{H}_2 = \text{Si} + 3\text{HBr}$ in a product reactor. The ultrapure granular silicon produced can be used to produce semiconductors and solar cells. The only material that needs replenishing once the process begins is metallurgical-grade silicon; all other reactants are separated and recycled.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15283/TN.

0097 Compacting Silicon Powder: Silicon powder is converted into flakes by passing it through a rolling mill

National Aeronautics and Space Administration, Washington, DC.

Apr 83 (G, H)

When powdered silicon is produced by the free-space decomposition of silane gas, the average particle size of the silicon produced is typically lowmicron to submicron, which makes the particles difficult to handle. Silicon powder was

compacted by sandwiching it between two flat sheets of metal and passing it through a horizontal rolling mill. This demonstrated the feasibility of the method.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div., P.O. Box 8757, BWI Airport, MD 21240. Refer to NPO-15271/TN.

Concentrating Trace Organics From Water: A new analytical technique is rapid, reproducible, and efficient
See 0401

Continuous Monitoring of Aerosols: Online spectrometer monitors the composition of individual aerosol particles
See 0436

Controlling Flow of Shear-Degradable Polymers: The key is gentle pressure reduction
See 0533

0098 Cryolite Byproduct in Silicon Production: Process reacts alumina hydrate with HF and NaF from silicon-production process

National Aeronautics and Space Administration, Washington, DC.

May 83 (G, H, K)

Cryolite (Na_3AlF_6), important as an electrolyte in aluminum refining, can be produced by adding a reaction step to a process that makes high-purity silicon from fluorosilicic acid. The new extended process has been demonstrated in the laboratory and could be used in a commercial plant.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15364/TN.

0099 Curing of Furfuryl Alcohol-Impregnated Parts: A longer cure and improved quality control prevent delaminations

National Aeronautics and Space Administration, Washington, DC.

Nov 83 (G, H)

A delamination problem in reinforced carbon/carbon parts impregnated with oxalic acid-catalyzed furfuryl alcohol is overcome by instituting two additional quality-control tests on the alcohol and by changing the curing conditions. The delamination had occurred following autoclave curing of the catalyzed furfuryl alcohol. It had been assumed that monitoring alcohol viscosity would suffice as a quality-control check. As a result of the investigation, the added alcohol quality-control tests are as follows: Alcohol in production use is tested weekly for water content. Water content must remain below 9.5 percent. DSC tests used to check the exothermic reaction characteristics of the impregnating solution. The exotherm must be strong.

FOR ADDITIONAL INFORMATION: Contact: Inquiries concerning rights for the commercial use of this invention should be addressed to Marvin F. Matthews, Lyndon B. Johnson Space Center, Mail Code AL-3, Houston, TX 77058. (713) 483-4871. Refer to MSC-20225/TN.

Development of a Tunable Zeeman Spectrometer for Analysis of Toxic Organic Compounds
See 0403

0100 Efficient Silicon Reactor: Narrow temperature excursions and large surface area minimize heat expenditure and processing time

National Aeronautics and Space Administration, Washington, DC.

Sep 83 (H, J)

High-purity silicon can be efficiently produced and transferred by a continuous two-cycle reactor. The new reactor operates in a relatively-narrow temperature range, 1,200 to 1,450°C, and uses a large surface area to minimize heat expenditure and processing time in producing silicon by the hydrogen reduction of trichlorosilane. Conventional methods of silicon production, by the hydrogen reduction of trichlorosilane, produce solid silicon units and require shutdown, setup, and startup between each production run, which requires a much greater heat expenditure.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15636.

0101 Eliminating Impurity Traps in the Silane Process: The extraction of a small slipstream from separators prevents impurities from building up

National Aeronautics and Space Administration, Washington, DC.

Mar 83 (D)

A modification has been proposed to reduce impurity trapping in the silane process for producing semiconductor-grade silicon. A small amount of liquid containing impurities is withdrawn from the processing stages in which trapping occurs and is passed to an earlier processing stage in which such impurities tend to be removed via chemical reactions. A problem with the silane process has been that certain impurities of intermediate volatility can become trapped in the separator loops. In the modified process small stream of liquid is withdrawn from the last two separators columns and returned with recycled silicon tetrachloride to the hydrogenator.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15217.

Enzyme Pollution Biodetection Systems: Development of a field instrument

See 0445

Fire-Retardant Epoxy Adhesives: Phosphorus in both resin and curing-agent molecules prevents fire propagation

See 0693

Fluidic Gas Concentration Sensor: Study demonstrates a reliable way of detecting dangerous concentrations of hydrogen sulfide and hydrocarbon gases

See 0448

Formaldehyde Surface Emission Monitor

See 0450

0102 Grain-Modification Additives for TNT: Some promising compounds have been found

Army Materiel Development and Readiness Command, Alexandria, VA.

Aug 83 (J)

A preliminary search has identified a number of nucleating agents for incorporation into 2,3,6-trinitrotoluene (TNT) castings. The U.S. Army Armament Research and Development Command undertook the search because there is a need to force TNT to solidify into small crystals. When solidified without additives, TNT tends to supercool and grow large columnar crystals that form cracks in the casting. The 5-nitrobarbituric acid trihydrate was the most effective suppressant of this group.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A085019, price code: AO2 or Contact Project officer S. Portnoy (201) 328-2708.

High-Energy Sulfuryl Chloride Batteries: These new batteries offer unprecedented power and energy density

See 0341

High-Performance Matrix Resins: Modified PMR polyimides have better processability and thermo-oxidative stability

See 0705

0103 High-Temperature Ultrafiltration Membrane: A polyimide membrane is made in a single step by solution casting

National Aeronautics and Space Administration, Washington, DC.

Mar 83 (H)

An ultrafiltration membrane with high-temperature capability is prepared from a polyimide that is soluble in an organic solvent such as dimethylacetamide. It is made in a single step by solution-casting phase inversion. In the method, a fully-imidized aromatic polyimide is dissolved in dimethylacetamide. Then a film of polymer solution is cast on a glass plate by casting blade inside a constant-temperature dry box. The porosity, hydraulic permeability, and pore size of the skin layer have been studied. The polymer retains its useful physical properties at temperatures well above previous operating temperatures.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to the Patent Counsel, NASA Resident Office - JPL, Mail Code: 180-601, 4800 Oak Grove Drive, Pasadena, CA 91103. In either case, refer to NPO-15431/TN.

Holographic Microscopy System: System achieves 2 micro m resolution throughout a 100-cm³ sample volume

See 0453

0104 Hydride Compacts for Hydrogen Storage: Process Improves these compacts, making them suitable for the safe storage of hydrogen

Department of Energy, Washington, DC.

Nov 83 (H, J)

A new process produces porous metallic matrix hydride compacts that can withstand repeated hydriding/dehydriding without disintegration. This development was stimulated by the need for a safer system to store hydrogen gas. Metal hydrides are promising storage media, but earlier processes of producing these compacts were unsuccessful. The binding material in these compacts would begin to disintegrate within one or two hydriding/dehydriding cycles.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,292,265, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1.

0105 Identification of Synthetic Fuels: Chromatographic techniques allow rapid identification of base stocks

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (J, K)

A method for determining and characterizing a wide variety of synthetic-based lubricants and functional fluids utilizes the techniques of pyrolysis-gas liquid-phase chromatography. Development and application of the techniques were performed by the U.S. Army Mobility Equipment Research and Development Command. Conventional analytical techniques, which are limited to a particular type of material, either require sophisticated equipment or are highly manpower intensive. Results indicated that the PGC method can provide accurate fingerprints for all these materials in a fraction of the time required by conventional wet chemical techniques.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A108117, price code: A03 or contact project officer Robert G. Jamison (703)664-4325.

Improved Electrolytes for Rechargeable Lithium Batteries: Electrolyte conductance and cathode rate capability are increased

See 0344

0106 Improved Estimates of Thermodynamic

Parameters: Techniques are refined for estimating heat of vaporization and other parameters from molecular structure

National Aeronautics and Space Administration, Washington, DC.

Mar 83 (H, J)

Improvements in the group-additivity technique for estimating thermo-dynamic parameters should make it easier for engineers to choose among candidate heat-exchange fluids for thermochemical cycles. The new techniques have been applied with success to several perfluorochemicals and hydrocarbon fluids. In the group-additivity method, the molar energy of vaporization and the molar volume at 25C are estimated by adding contributions made by each atom or group in the molecule structure. Using a parabolic equation with three adjustable parameters, the heat of vaporization can be used to estimate the boiling point, and vice versa.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-14880/TN.

0107 Improved Heat-of-Fusion Energy Storage: Alkali metal/alkali-halide mixtures are proposed for preventing solid buildup during energy recovery

National Aeronautics and Space Administration, Washington, DC.

Apr 83 (C, J)

The heat-of-fusion method of storing energy may be made more practical by the use of some alkali metal/alkali-halide mixtures, such as Na/NaCl, for the phase-change materials. Solid material would not build up on the heat exchanger during energy recovery if such a mixture were used. In conventional latent-heat energy storage, solidification during the energy-extraction period is likely to occur at the surface of the heat exchanger. An alkali metal/alkali-halide phase-change material, at a temperature high enough to have two immiscible molten phases, would avoid this problem.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div., P.O. Box 8757, BWI Airport, MD 21240. Refer to NPO-15318/TN.

0108 Infrared Technique to Determine Hydroxyl Equivalent Weight

Department of the Air Force, Washington, DC.

Aug 83 (J, K)

An infrared technique to determine hydroxyl equivalent weight was developed. This method is relatively rapid and requires a semi-micro quantity of sample. The tetrahydrofuran-associated hydroxyl peaks in the infrared region of 3450 cm are studied and used for quantitative analysis of hydroxyl groups of prepolymers examined. The infrared technique to determine hydroxyl equivalent weight has been evaluated in a variety of hydroxyl-containing chemicals. The results of the analyses revealed that the infrared method to determine equivalent weight is as good or better than the currently available chemical methods to determine equivalent weight.

FOR ADDITIONAL INFORMATION: Contact: Ms. Michele Irwin, Air Force Rocket Propulsion Lab./MKPA, Edwards AFB, CA 93523 (805)277-5493.

Innovative Biomass Gasifier in Final Research Stages

See 0346

Ion Mass/Velocity/Charge Spectrometer: m/q is resolved to 1 part in 40

See 0458

0109 Laser and Electron Bombardment Facility

Department of Health and Human Services, Washington, DC.

Dec 83 (E, J)

High-energy electron accelerators and laser systems are available to researchers at the Center for Fast Kinetics Research (CFKR) at the University of Texas in Austin. Investigators can use either of two Van de Graaff electron accelerators integrated into electron pulse radiolysis systems capable of firing and recording the effects of very brief--from nanosecond to millisecond--pulses of electrons. Researchers at the CFKR have developed a magnetic steering system that allows high-intensity electron beams to be directed to any of three independent target areas. Visiting investigators at the facility are assisted by core research staff who monitor the computer-controlled experiments and data collection. An extensive array of software has been written to aid investigators in their studies.

FOR ADDITIONAL INFORMATION: Contact: Dr. E. L. Powers, University of Texas at Austin, Patterson Building, Room 131, Austin, Texas 78712; (512) 471-7583.

0110 Laser-Induced Catalytic Polymerization: Urethane reactions are significantly enhanced

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (H, J)

A study on the formation of urethane polymers catalyzed by organometallic compounds has revealed that ultraviolet and visible radiation can significantly increase the reactivity of the catalysts. The work was conducted by the U.S. Army Missile Command. Lasers are attractive for controlling polymerization reactions because the intensely concentrated beam allows polymerization to occur at ambient rather than at elevated temperatures. The following six showed increased reactivity and were selected for laser studies: ferrocene, benzoylferrocene, ferrocenedicarboxylic acid, ferric acetyl-acetonate, ferric cupferrate, and dibutyltin diacetate. Results indicated that the rate enhancements for the reactions both wavelength and catalyst dependent.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A117158, price code: A02 or contact project officer B.D. Allan (205) 876-1607.

Liner for Silicon Reactor: A coating of sodium tetrafluoride minimizes contaminating high-purity silicon

See 0719

0111 Low-Waste Purification of Silicon: A continuous-flow process converts metallurgical-grade silicon to semiconductor-grade silicon

National Aeronautics and Space Administration, Washington, DC.

Mar 83 (D, G, H)

The ultra-high-purity silicon required for solar cells, transistors, and integrated circuits can be produced from metallurgical-grade silicon by the formation and pyrolysis of silane gas (SiH₄) in a continuous-flow process that maximizes product purity with a minimum amount of equipment. The integrated process recycles unreacted and byproduct materials, thus minimizing material losses and simplifying waste disposal. It also ensures the effective removal of impurities, including boron. The principal merit of this system is the specific sequence in which the different steps are integrated.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Division, P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15033/TN.

Measurement of Aerosol Carbon Content

See 0412

Measuring Formaldehyde Concentration In Indoor Air: Impregnated filters and test atmospheres for calibration make monitoring possible at parts per billion

See 0462

0112 Measuring Hydrogen Properties in Aluminum: Real-time measurements of gas evolution are correlated with porosity data

National Aeronautics and Space Administration, Washington, DC.

Feb 83 (H, K)

A system measures the concentration and diffusion coefficient of hydrogen in pure aluminum. Its principal components are a high-temperature ultra-high-vacuum furnace and a quadrupole mass spectrometer. Quantities of hydrogen and other gases that evolve from the heated metal are measured in real time and correlated with data on Aluminum porosity. The technique permits the measurement of solubility, diffusion coefficients, and outgassing rates in low vapor pressure materials either in solid or liquid phase.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div, P.O. Box 8757, BWI Airport, MD 21240. Refer to LAR012906/TN.

0113 Mechanism of Accelerated Curing of Epoxy Resins: The details of a three-component reaction are investigated

Army Materiel Development and Readiness Command, Alexandria, VA.

Oct 83 (H, J)

A study has been made of the mechanism by which trisubstituted ureas, such as monuron, N-(4-chlorophenyl)-N', and N'dimethylurea, accelerate the dicyandiamide cure of epoxy resins. The study, which was made by the U.S. Army Mate-

rials and Mechanics Research Center, found that dimethylamine is generated by a cyclocondensation reaction between the urea and the resin to form a 2-oxazolidine. It was further found that the effectiveness with which dimethylamine activates dicyandiamide, especially in comparison with such other materials as trimethylamine, makes this amine unique..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A104 658, price code: A02 or contact project officer Joseph Bornstein (617) 923-3466.

0114 Methods For Determining Gas Contents of Various Rock Types

Department of the Interior, Washington, DC.

Nov 83 (J, K)

There was a need to provide the mining industry with a method for determining the gas content of ore bodies and associated strata for use in mine planning. Two methods were developed. The first developed involved dissolving minerals to measure gas emission. This method, however, can only be used with soluble minerals. A second method, therefore, was developed for use with insoluble minerals. With this method, the sample is crushed in a ball mill. The crushing method more closely approximate a mining situation; the sample is crushed as in mining and the amount of gas released relates to the amount of gas that would be released during a mining operation.

FOR ADDITIONAL INFORMATION: Contact: David M. Hyman, Bureau of Mines, Pittsburgh Research Center, Cochran Mill Road, P.O. Box 18070, Pittsburgh, PA 15236; (412)675-6525.

Mobile Air Sampler: Vehicle-mounted sampler gathers specimens along highways and in tunnels

See 0471

Modular Molten-Salt Electrochemical Cell: Modules make cell rugged and easy to assemble

See 0357

0115 Multinuclei NMR Spectroscopy Resource

National Institutes of Health, Bethesda, MD.

Mar 83 (E, J)

A resource that combines multinuclei nuclear magnetic resonance (NMR) spectroscopy with data processing capabilities is available at Syracuse University, New York. The resource is supported by the Biotechnology Resources Program of the NIH Division of Research Resources. It is intended primarily for scientists whose studies require lengthy periods of data acquisition and highly sensitive NMR spectroscopy of 13 carbon, 15 nitrogen, and 31 phosphorus nuclei. Researchers can communicate directly with the Syracuse University resource computer by telephone. Through NMR/SPECNET, scientists can obtain data from experiments in progress or send raw data to the resource computer and receive real time, digital, or graphic output. The laboratory houses a biochemical preparations facility and office space for visiting scientists and coworkers.

FOR ADDITIONAL INFORMATION: Contact: Dr. George C. Levy, Resource for MultiNuclei NMR and Data Processing, Department of Chemistry, Syracuse University, Syracuse, NY 13210.

0116 Noncrystalline Thin-Film Materials: A broad range of thin-film materials is characterized

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (H)

A program on the molecular design and synthesis of noncrystalline thin-film materials investigated the characteristics of noncrystalline solid (NCS) formations and their potential technological applications. The program was conducted for the U.S. Army Research Office. The advent of fabricating NCS materials arose with such developments as the rapid quenching of metals samples and by the discovery of splat-cooling, a recent technology of forming solids from the vapor phase by sputtering techniques. The wide range of materials investigated included: insulator made of nickel, iron, and tungsten oxides and of various polymers; semiconductors made of metal borides, alumina/metal and polymer/metal cermet films (Using silicon, germanium, tellurium, and other elements); and magnesium/zinc alloys. Thin films of these materials were made by RF-sputtering (see figure). In addition to the exploratory study, structure and bonding were investigated via spectroscopy and electron microscopy.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A103558, price code: A07.

Portable Radiometer Identifies Minerals in the Field: Field unit determines spectral reflectance ratios

See 0484

PPQ's Containing Pendent Ethynyl and Phenylethynyl Groups: Polyphenylquinoxalines containing cross-linking groups have higher use temperature and solvent resistance

See 0735

Prepolymer Syrup for Encapsulating Solar Cells: N-butyl acrylate polymer/monomer syrup can be used for dipping and coating

See 0366

0117 Producing Cryolite From Waste Sodium Fluoride: Use of waste NaF could improve the economics of silicon production

National Aeronautics and Space Administration, Washington, DC.

Jan 83 (D, J)

A simple chemical process makes synthetic cryolite (Na₃AlF₆) by utilizing the byproducts of one kind of silicon production process. The potential result of commercialization could be an economic benefit to the silicon industry or to the aluminum industry, in which cryolite is used as a flux. Both NaF and HF are byproducts of the process involving the reaction between Na and SiF₄ to produce solar-grade silicon. Alumina hydrate is combined with the waste liquor. The cryolite, being relatively insoluble in water, readily precipitates out of solution.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div. P.O. Box 8757 BWI Airport, MD 21240. Refer to NPO-15258.

0118 Producing Curie Quantities of Sr-82, 85 Isotopes: A hot cell purifies Sr-82-82, 85 and other isotopes from proton-irradiated molybdenum

Department of Energy, Washington, DC.

Nov 83 (J)

An improved process produced and purifies curie quantities of Sr-82, 85; Y-88; and the long-lived Rb, from the intermediate-energy proton-spallation reactions on Mo targets. The six-step process of producing neutron-deficient isotopes will benefit nuclear chemistry, nuclear medicine, and physics research.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,276,267, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1. For licensing information contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

0119 Producing Rapid pH Changes: An intense flux of laser light produces rapid pH changes in a solution

Department of Energy, Washington, DC.

Apr 83 (J, K)

A new method initiates a rapid pH change in a solution by irradiating it with an intense flux of laser light, at a frequency that produces a substantial pK change to a compound in the solution. The pH jump used in conjunction with indicator dyes has application in a variety of optical devices. Indicator dyes have optical properties (colors), which are extremely sensitive to pH. They are useful in providing spectroscopic means to indicate the hydrogen-ion concentration of a solution.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,287,035, which is available from: Commissioner of Patents Washington, DC 20231 for \$1.00. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. DOE, Washington, DC 20585.

A Radiation Detection System: Special fluors emit light at wavelengths greater than 500 nm and with a decay time of less than 10 ns in response to radiation

See 0861

0120 Removing Chlorides From Metallurgical-Grade Silicon: Process for making low-cost silicon for solar cells is further improved

National Aeronautics and Space Administration, Washington, DC.

Mar 83 (D)

Upgrading metallurgical-grade silicon to high-purity semiconductor-grade silicon for low-cost solar cells requires a critical step in which chlorosilanes are separated from a silicon tetrachloride carrier for further processing. When the chlorosilanes are separated, such impurities as arsenic chloride, phosphorus chloride, and boron chloride tend to stay with them. However, a small amount of silane added to the chlorosilane and silicon tetrachloride mixture eliminates the impurities.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15218/TN.

0121 Removing Nitrogen and Sulfur From Carbonaceous Liquids: Catalysts can make these liquids suitable as boiler fuels or as refinery feedstock

Department of Energy, Washington, DC.

Mar 83 (C, D)

Catalysts consisting of metal oxides impregnated within a porous, mostly alumina base are effective in the denitrogenation and desulfurization of carbonaceous liquids. Carbonaceous liquids, produced in the liquefaction of coal, oil shale, tar sands, and the like, can be suitable as boiler-furnace fuels or as refinery feedstock, provided that they have sufficiently reduced levels of nitrogen and sulfur. The new catalysts are pellets, which are 95 percent alumina, with a surface area of 200 to 350 sq m, pore volume of 0.70 to 0.85 ml/g, and an average pore diameter of 85 to 160 angstroms..

FOR ADDITIONAL INFORMATION: The document on which this technical note is based is U.S. Patent 4,326,995 which is available from: Commissioner of Patents, Washington, DC 20231 for \$1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. DOE, U.S. Department of Energy, Washington, DC 20585.

0122 Separating Silicon and Sodium Fluoride by Melting: Silicon is withdrawn from the bottom of a crucible after two immiscible liquids form

National Aeronautics and Space Administration, Washington, DC.

Jul 83 (D, H)

A method for separating mixtures of silicon and salts of sodium and fluorine takes advantage of the immiscibility of the two components. The method may be used in conjunction with the reduction of SiF₄ gas by sodium to prepare large quantities of silicon for solar-cell fabrication and other uses. It could replace the method of multiple leachings to dissolve NaF and Na₂SiF₆ salts, which exposes the silicon to possible oxidation loss and contamination.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15363.

0123 Separating Silicon From Si/NaF Mixtures: A new method takes advantage of the lower melting point of NaF

National Aeronautics and Space Administration, Washington, DC.

Apr 83 (G, J)

Silicon can be extracted from the mixture produced when silicon tetrafluoride is reduced by sodium, by taking advantage of the lower melting point of NaF. The new method is effective at temperatures up to 400 C below the melting point of Si. This results in energy and economic savings: simpler and smaller furnaces, less volatilization loss, and a high percentage of separation. In the new method, the Si/NaF mixture is heated in a graphite crucible to around 1,100 C, which is above the melting point of NaF but well below the melting point of silicon. The bottom of the graphite crucible has openings through which the NaF is discharged.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div., P.O. Box 8757, BWI Airport, MD 21240. Refer to NPO-15365/TN.

0124 Silicon-Delivery Tube: Heated quartz tube transfers molten silicon

National Aeronautics and Space Administration, Washington, DC.

Sep 83 (H)

A delivery tube transfers molten silicon between high-temperature vessels. The transport tube is sealed to the delivery vessel and receiving vessel and is slanted so that grav-

ity moves the molten silicon. The delivery vessel could be the output end of a growth reactor, in which pure silicon is produced by the reduction of trichlorosilane at 1200C. The receiving vessel could be a crystal-growing crucible. The only part of the delivery tube to contact the molten silicon is the quartz inner tube..

FOR ADDITIONAL INFORMATION: Contact: Director, Technology Transfer Division, P.O. Box 8757, BWI Airport, MD 21240 (301) 621-0100 Ext. 241. Refer to NPO-15637.

0125 Sodium Gluconate in Corrosion-Removing Compounds: Direct method is more accurate and requires minimum sample preparation

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (J, K)

An analytical method using gas/liquid chromatography has been developed for determining the concentration of sodium gluconate, a chelating agent, in metal corrosion-removing compounds. The work was conducted by the U.S. Army Mobility Equipment Research and Development Command. The conventional method based on optical activity for verifying the composition of corrosion-removing conditioners has been inadequate for detecting lower cost, inferior substitutes for the sodium gluconate. The procedure for the assay involves converting the gluconic acid to a silyl derivative..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A107244, price code: A02 or contact project officer Troy Nichols (703)664-5889.

A Solvent-Resistant, Thermoplastic Poly(imidesulfone): Polymer incorporates the desirable properties of polyimides and polysulfones

See 0752

Sophisticated Electron Microscope Developed

See 0493

Sterilizable Binder Is Stable at 135 C: Material with few unsaturated double bonds has the needed stability

See 0757

A Ternary Liquid Scintillator: Liquid scintillator makes an effective radiation-to-light converter

See 0863

Thermoset/Thermoplastic Aromatic Polyamides for Composites: Pendent propargyl groups serve as latent cross-linking agents in a new series of polyamide resins

See 0765

0126 Titanium Subhydride Production Process: Process improves the reproducibility of yields of titanium subhydride

Department of Energy, Washington, DC.

Jul 83 (J)

An improved process produces titanium subhydride in a reactor by heating a selected amount of finely-divided titanium compound at a definite temperature range and time. Hydrogen is removed uniformly from each grain of titanium hydride powder that is loaded in trays into a stationary reactor contained in a furnace. In this process, H₂ is constantly removed so that equilibrium is never reached. This produces a subhydride of uniform titanium/hydrogen composition. If the charge that is loaded into the reactor is expressed as TiH_y, then, depending on the reaction param-

eters (which can be selected by the operator), the product will be TiH_x (where $X < y = <$) The new material is particularly useful in producing exceptionally-reliable, uniform pyrotechnic raw-material formulations, such as titanium subhydride/potassium perchlorate, for the production of valve-actuator assemblies and spark-insensitive detonators.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S., Patent 4,309,230, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1.00. For licensing information, contact: Office of Assistant General Counsel for Patents, US DOE, Washington, DC 20585.

0127 Tube-Furnace Production of Silicon: Silane gas decomposes to silicon in a packed bed with a temperature gradient

National Aeronautics and Space Administration, Washington, DC.

May 83 (G, H)

Silicon of semiconductor-grade purity would be produced in particle form by the decomposition of ultrapure silane gas in a proposed packed-bed tubular furnace reactor. The decomposition temperature is about 700 C, and the product size depends on the size of the silicon particles that constitute the packed bed. The silane gas, fed into the packed bed of moving particles in the temperature-gradient region, decomposes to form more particles. The silicon particles fall out of the end of the furnace tube.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15274/TN.

Unique Chemical Gas Sensors, No Bigger Than a Pen

See 0501

0128 Viscosity Depressants for Coal Liquefaction: Certain unsaturated hydrocarbons would prevent coal from solidifying during liquefaction

National Aeronautics and Space Administration, Washington, DC.

Nov 83 (G, H)

A proposed process modification would incorporate viscosity depressants to prevent coal from solidifying during liquefaction. The depressants would reduce the amount of heat needed to liquefy coal. While the coal is processed, unsaturated hydrocarbons containing eight or more carbon atoms would be put into the liquid medium to act as viscosity depressants.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer, Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15174/TN.

Water-Vapor Sample Holder for Mass Spectrometers: A sample of ambient air is captured for use as a calibration standard

See 0506

CIVIL ENGINEERING

Agricultural Engineers Save Water With A Fabric Dam

See 0031

0129 Biomass Model of Reservoir Fish and Fish-Food Interactions

Department of the Interior, Washington, DC.

Jul 83 (A, E)

A mathematical model was developed to help fishery managers evaluate the food-chain relations of fishes in reservoirs and to assess the effects of changes in reservoir operations, fishery management practices, or harvest on fish and fish-food organism. Input data consist of the standing crop of fish (weight per unit area, by species and size classes) sampled during the growing season. The model estimates the biomass of fish supported by diets of plants, detritus, benthos, zooplankton, fish, and terrestrial invertebrates. It also provides conservative estimates of fish production and the amount of food of a particular type required annually to maintain the biomass of fish that eat each type of food. A computer program is available for the IBM 370/155 computer and for the HP 9830A calculator.

FOR ADDITIONAL INFORMATION: Contact: Division of Fishery Research, Fish and Wildlife Service, U.S. Department of the Interior, Washington, D.C. 20240; (202) 653-8772.

Can-Filled Crash Barrier: Inexpensive materials and simple construction protect motorists at low and moderate speeds

See 0914

Carbon Filters for Potable Water: Filter removes hydrocarbon taste and odor

See 0398

Cleaning Petroleum Tankers for Potable Water Service: Conversion procedures are described

See 0666

0130 A Computerized Water Management Tool: The instream flow incremental methodology

Department of the Interior, Washington, DC.

Aug 83 (A, D)

The Western Energy and Land Use Team has developed a tool which makes it possible to evaluate the impacts on fish and invertebrate habitat and instream recreational activities resulting from incremental modifications in streamflow, changes in channel morphology, and concurrent changes in water quality. The Instream Flow Incremental Methodology (IFIM) is designed to simulate hydraulic condition and availability of habitat for a given species and life stage or the usable waters for a particular instream recreational activity. Based on information about a species and its habitat or a recreational use, an index called weighted usable area is calculated for each reach of stream considered. The index displays the optimal square feet equivalent of suitable habitat are compared to the total square feet of surface area. These results help the fishery and water resource managers to evaluate the potential impacts of incremental change in stream flow.

FOR ADDITIONAL INFORMATION: Contact: Dr. Clair D. Stalnaker, Western Energy and Land Use Team, 2627 Redwing Road Creekside One, Fort Collins, CO 80526; (303) 226-9331.

0131 Concrete Excels for Deep-Ocean Construction

Department of the Navy, Washington, DC.

Mar 83 (H)

The Naval Civil Engineering Laboratory (NCEL), Port Hueneme, CA, this year entered the final phase of a long-range study of deep-ocean concrete structures with the recovery of a 4000-pound concrete sphere after 10 years of continuous exposure to the high pressure of the deepocean, at a depth of 3200 feet. The results of ocean exposure and laboratory physical and mechanical testing of this and other

retrieved specimens corroborated contention that concrete is an excellent material for deep-ocean construction. An objective was to examine the strength of concrete after high-pressure, cold(40F) ocean exposure.

FOR ADDITIONAL INFORMATION: Contact: Navy Technology Transfer Fact Sheet, Code E411, Naval Surface Weapons Center, Dahlgren, Virginia 22448. Refer to 071002/TN.

0132 Controlling Streambeds Slows Erosion

Department of Agriculture, Washington, DC.

Aug 83 (D)

An inexpensive streambed grade control structure saves soil by slowing the flow of water and dissipating energy in streams. The structure is designed for use in streams lacking natural rock outcrops, which stabilize the streambed. The grade control structure features a baffle plate (to break waterflow strategically) placed in the energy dissipation pool near the downstream end of the structure to aid in slowing the water and in dissipating its force.

FOR ADDITIONAL INFORMATION: Contact: W. Campbell Little, USDA Sedimentation Laboratory, P.O. Box 1157, Oxford, MS 38655; (601) 234-4121.

0133 Dredging and Dredged Material Disposal

Department of the Army, Washington, DC.

Oct 83 (D)

Manual provides an inventory of dredging equipment and disposal techniques used in the United States. It presents engineering and design guidance for both new work and maintenance dredging projects as well as guidance for other activities associated with both types of projects. Although the guidance is primarily for projects that have been authorized and are in the preliminary design stages, much of the information is equally applicable to the preliminary engineering and design required during the authorization phase of dredging projects. Procedures for evaluating and selecting equipment and for evaluating disposal alternatives are also included.

FOR ADDITIONAL INFORMATION: Copies of the manual can be obtained by letter requests addressed to: Commander, U.S. Army Corps of Engineers (DAEN-ASPD), 890 South Pickett Street, Alexandria, VA 22304.

0134 Field Measurement of Thermal Inertia: Radiometric measurements determine thermal inertia for geologic materials

National Aeronautics and Space Administration, Washington, DC.

May 83 (K)

A simple method and apparatus measure the thermal inertia of geologic materials in the field. Such measurements are correlated with data obtained by remote sensing, for discriminating varieties of rock encountered when exploring for minerals by aircraft or by satellites equipped with infrared scanners. The thermal-inertia meter measures the TI in situ by recording the surface-temperature rise of the materials.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15309/TN.

Flowthrough Water Chlorinator: Portable water-disinfection system is tested

See 0410

0135 Fragmentation Characteristics of Dividing Walls: Masonry block walls do not fragment as drastically as reinforced-concrete walls

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 (D, H)

A small-scale test program was performed to determine the fragmentation characteristics of reinforced-concrete and masonry block dividing walls subjected to close blast effects. The program was conducted for the U.S. Army Armament Research and Development Command. The results may be of interest to manufacturers of explosives and to those using explosives products.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A104348, price code: A09 or contact project officer R. M. Rindner (201) 328-3828.

0136 Large, Easily Deployable Structures: Compactly folded structures are assembled quickly with relatively little effort

National Aeronautics and Space Administration, Washington, DC.

Jun 83 (D)

A reported study of concepts for large space structures will interest those designing scaffolding, radio towers, rescue equipment, and prefabricated shelters. A double-fold, double-cell module was selected for further design. The double-fold, double-cell concept is viable for deployment by humans outside a space vehicle as well as by a remotely operated manipulator.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25647/TN.

0137 Method Is Developed To Help Predict Soil Liquefaction

Department of Commerce, Washington, DC.

Aug 83 (D)

Researchers have proposed an alternative method for determining whether excess pore water pressure will develop at a sandy site during an earthquake. Sandy soils often 'liquefy' when severe ground motion induces a buildup of pore water pressure causing heavy structures to sink, light buried structures to float to the surface, and unbalanced structures to overturn. This method is based on the premise that the reduction of soil stiffness due to the deformation of a soil mass caused by the number of strain cycles or vibrations that occur in an earthquake, can be correlated with the buildup of excess pore water pressure. Furthermore, there is a threshold strain, a point at which deformation is imminent, below which no pore water pressure buildup can occur. Thus, sites which experience strains smaller than the threshold will not be subject to excess pore water pressure buildup and consequently, will not liquefy.

FOR ADDITIONAL INFORMATION: A report can be ordered for \$6.50 prepaid from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

0138 Nonprimary Explosive Detonator: Relatively safe, reliable detonator uses a train of nonprimary explosives and a low-voltage igniter

Department of Energy, Washington, DC.

Sep 83 (D)

A new detonator uses nonprimary explosives arranged to detonate military or commercial charges via deflagration-to-detonation transition. The design features three advantages: more reliable detonation as opposed to detonators equipped with a flying plate that may shatter or not accelerate fast enough to set off an explosion; improved safety because the nonprimary explosive materials are more immune to accidental detonation than detonators charged with primary explosives; and operates with small ignition currents. FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,316,412, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1. For licensing information, contact Office of Assistant General Counsel for Patents, U.S. DOE, Washington, DC 20585.

Passive Detection of Leaks in Buried Pipes: A correlation of acoustic signals pinpoints the location of the leak

See 0479

0139 Pavement Patching Research Is Compiled and Released

Department of Transportation, Washington, DC.

Nov 83 (D)

A new report presents guidelines and how-to-do-it recommendations for constructing patches during cold weather (emergency basis), cold weather (routine basis), and warm weather (routine basis). Patching of flexible, rigid, and composite pavements is addressed. Recommended patching techniques include use of bituminous and portland cement patching materials. Pavement distress and causes are indexed to the recommended repair procedures. This report should be of interest to maintenance supervisors and foremen, and to city and county engineers.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB83-183244, price code: A05.

0140 Porous Asphalt Lets Water Through Like a Sieve

Department of Agriculture, Washington, DC.

Dec 83 (D)

Scarce groundwater supplies may be increased by a new design for parking lots and access roads. The newly developed asphalt system, called full-section porous asphalt, is built by layering porous asphalt over a gravel bed that holds rainwater until it percolates into the ground. Porous asphalt is made by the same process as regular asphalt, but without the fine bits of gravel that fill up the gaps in regular asphalt. Only the larger sizes of gravel are used (between 1/10 and 1/2 inch wide). Water readily flows through this mixture. Since porous asphalt prevents puddles, porous is used as a coating over regular asphalt to drain stormwater from the road surface. The newly-developed full-section porous asphalt consists of layers of porous asphalt over a carefully designed bed of gravel. This design allows water to flow through the road surface into the gravel bed, where it is held until it percolates into the ground. Full-section porous asphalt is much more effective than grass for recharging groundwater.

FOR ADDITIONAL INFORMATION: Contact: James Urban, Northeast Watershed Research Lab, 111 Research Bldg. A, University Park, PA 16802, (814) 238-4976.

0141 Refined Method of Predicting Consolidation of Confined Dredged Material

Department of the Army, Washington, DC.

Nov 83 (D)

Recent studies of the consolidation aspects of dredged material behavior have led to an improved method of predicting settlement with time in confined disposal areas. The studies was part of the Dredging Operations Technical Support (DOTS) Program's work unit for verification and refinement of engineering methodologies for dredged material disposal operations. Predictions of consolidation have long been made using a small-strain theory developed by Terzaghi in the 1920s. The new method is based on the finite-strain theory of consolidation, which takes into account the nonlinearity of soil compressibility, the variable nature of soil permeability, and the very large strains undergone during the consolidation process.

FOR ADDITIONAL INFORMATION: Contact: Dr. Kenneth Cargill, Geotechnical Laboratory, U.S. Army Waterways Station, CE, Vicksburg, Miss.

Retrofit Noise Control Techniques for Crushing and Screening Plants

See 0846

0142 Screen Secures Detonator to Explosive Charge: The distance between cap and charge is easily controlled with a brass-screen sleeve

National Aeronautics and Space Administration, Washington, DC.

May 83 (D)

A brass-screen sleeve attaches a blasting cap to a fuse, shaped charge, detonating cord, or other formed explosive. The screen makes it easy to control the distance between the cap and the charge, because the user can see both parts, and to cool the cap by convection, making the use of low-cost blasting caps possible for some hot environments. Previously, a wooden spool was used to connect the parts.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagram is available by ordering the monthly subscription package, order number PB83-925405, price code E02.

0143 Wing-Like Device Keeps Harbor Bottoms Clear of Sediments

Department of the Navy, Washington, DC.

Oct 83 (D)

An oceanographer at the Scripps Institution of Oceanography in San Diego has discovered that a device shaped like an inverted wing, placed near the bottom of a harbor, can keep sediments suspended and moving, and provide a cheap and passive method of dredging. The device works by creating vortices-swirls and eddies in its wake which stir up and keep the bottom sediments moving to deeper water. Called a 'vortex foil', the wing is based on the aerodynamic principles of the airfoil. With many of these wings arranged like a flock of inverted geese along the bottom, it would be possible to keep the sediment in suspension until it has bypassed the harbor and reached the open sea.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer, Code E411, March 83 No. 1, Naval Surface Weapons Center, Dahlgren, VA 22448.

COMBUSTION, ENGINES, & PROPELLANTS

0144 Abradable Seals for Gas Turbines: A Chem-Braze method is both reliable and economical

Army Materiel Development and Readiness Command, Alexandria, VA.

Jul 83 (G, H)

A new technique for attaching seals in gas turbine compressors saves on both materials and labor. The new method is an improved Chem-Braze bonding system for attaching sintered abradable seals to compressor blade-tip shrouds. The improved method, developed for the U.S. Army Aviation Research and Development Command, uses glycerin as an inhibitor to prevent the premature evaporation of bonding materials. The inhibitor allows adequate time to attach the seal to the compressor and thus prolongs the working life of the seal. A preliminary economic analysis shows a 74-percent cost savings.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A086872, price code: A03 or contact project officer S. T. Narsavage (314) 263-1625.

Cement for Abradable Gas-Turbine Seals: A new chemical bonding system costs less than conventional brazing

See 0662

0145 Ceramic Components for Gas Turbines: Brittle materials withstand high temperatures

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (D, H)

Ceramics show promise for use as highly-stressed gas-turbine components, according to a program sponsored in part by the U.S. Army Materials and Mechanics Research Center. The program was a comprehensive study and development effort involving an iterative approach to problems of component design, materials, fabrication, test, and evaluation. If successful, this and similar efforts will eventually result in the production of low-cost uncooled gas-turbine engines that, because they operate at higher temperatures, are more efficient than turbines manufactured from alloys. Methods were developed to design ceramic components including rotors and blades, using two- and three-dimensional finite-element computer codes for heat transfer and stress.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A106670, price code: A10 or contact project officer Nathan B. Katz (617) 923-3415.

0146 Ceramic Material as Heat Exchanger in Gas Turbines: This material withstands the severe environment of a gas-turbine engine

Department of Energy, Washington, DC.

Jun 83 (H)

High-temperature, low thermal-expansion, corrosion-resistant ceramic containing ZrO₂/MgO/A₂O₃/SiO₂ as the major ingredients makes an effective heat-exchanger material for such continuous-combustion engines as gas turbine and Stirling. The material has a low porosity and high den-

sity and possesses thermal-expansion and corrosion-resistant properties superior to those of other ceramics. The material consists of about 11-to-13 weight percent MgO, 33-to-35 weight percent Al_2O_3 , 48-to-51 weight percent SiO_2 , and 3-to-10 weight percent ZrO_2 .

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,292,083, which is available for \$1.00 from Commissioner Patents, Washington, DC 20231. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

0147 Ceramic Materials for Vehicular Engines: Study reviews the ceramic technology

Army Materiel Development and Readiness Command, Alexandria, VA.

Aug 83 (H)

Ceramic materials on gas-turbine, diesel, and Stirling engines contribute to higher efficiency by allowing higher operating temperatures. A report on these ceramic materials and preliminary ceramic-engine development programs was prepared by the U.S. Army Materials and Mechanics Research Center. Currently, three families of high-temperature ceramics are under consideration: aluminosilicates, silicon nitrides, and silicon carbides.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A087589, price code: A02 or contact project officer R. Nathan Katz (617) 923-3415.

0148 Compression Ratio Adjuster: Automatic adjustment conserves fuel at any power setting, from idle to full throttle

National Aeronautics and Space Administration, Washington, DC.

Jan 83 (D)

A new mechanism alters the compression ratio of an internal-combustion engine according to the load so that the engine operates at top fuel efficiency. Ordinary gasoline, diesel, and gas engines with their fixed compression ratios are inefficient at partial load and at low-speed full load. The mechanism ensures that the engines operate as efficiently under these conditions as they do at high load and high speed. The mechanism alters compression ratio--the ratio of cylinder volume with the piston at bottom dead center to that with the piston at top dead center--by altering the length of the connecting rod.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer, P.O. Box 8757, BWI Airport, MD 21240 or for inquiries concerning nonexclusive or exclusive license for commercial development should be addressed to the Patent Counsel, Johnson Space Center, Mail Code: AL-3, Houston TX 77058. In both cases refer to MSC-18807.

Displaying Helicopter Engine Data: Programmable model shows how pilots' jobs can be made easier

See 0008

Durability Test for Turbine Ceramics: Thirteen commercially-produced ceramic materials are evaluated

See 0681

0149 Equation for Combustion Noise: Mathematical expression relates noise to characteristics of the combustion process

National Aeronautics and Space Administration, Washington, DC.

Jan 83 (J)

A mathematical relationship has been derived for the interactions between a turbulent flame and combustion noise. The relationship is a rigorous theoretical correlation of combustion noise and the combustion process. As such, it establishes a foundation for acoustic measurements as a tool for investigating the structure of turbulent flames. The mathematical relationship is expected to aid researchers in the field of noise generated by combustion. Such noise is a strong contributor to the total noise radiated by turbine engines and heavy industrial burners. It is not only an annoyance to humans but also may cause the failure of liners and other components.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div. P.O. Box 8757, BWI Airport, MD 21240. Refer to NPO-15156.

0150 Equations for Composite-Propellant Burning: Progress is made toward a predictive model

National Aeronautics and Space Administration, Washington, DC.

May 83 (J)

A reported study of composite-propellant burning summarizes recent advances in understanding the behavior of propellant formulations based on ammonium perchlorate (AP), binder, and aluminum in various proportions and particle size distributions. The approach presented in this report incorporates an adapted version of an earlier model for monopropellant AP. The objective is to predict the burning-rate characteristics of composite propellants at high pressure.

FOR ADDITIONAL INFORMATION: To obtain a copy of the report, contact Technology Transfer Division, P.O. Box 8757, BWI Airport, MD 21240. Refer to: NPO-15324/TN.

0151 Exhaust-Plume Impingement Characteristics: Model estimates the effects on nearby objects

Department of the Army, Washington, DC.

Apr 83 (J)

A new model for rocket-exhaust plumes calculates the effects of heat, pressure, and particle-impingement on nearby structures. The model compares well with experimental data. It is the result of theoretical and experimental studies of objects exposed to the plumes of rocket exhausts at low altitudes. The model has potential industrial applications in studies of the impingement of multiphase mixtures inside coal-gasification equipment and turbines.

FOR ADDITIONAL INFORMATION: Contact: Director, Technology Transfer Division, P.O. Box 8757, BWI Airport, MD 21240. Refer to MFS-25489.

0152 Feed System for Coal Gasifier: Inlet arrangement improves combustion and minimizes caking in fluidized-bed reactors

Department of Energy, Washington, DC.

Aug 83 (D)

A new inlet arrangement for a fluidized-bed coal-gasification reactor consists of three concentric vertical tubes that feed solid combustible, oxidizing gases, and fluidizing and cooling gases into the reaction zone. Unlike the conventional inlets that are prone to plugging and uneven combustion,

the new inlet promotes uniform combustion and eliminates decaking pretreatment of the solid combustibles.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,282,010, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. DOE, Washington, DC 20585.

0153 High-Temperature Radial Turbine: Project stages prior to aerodynamic testing are completed

Army Materiel Development and Readiness Command, Alexandria, VA.

Aug 83 (D, H)

Basic design objectives have been achieved in a program to build a cooled, high-temperature radial gas turbine. Sponsored by the U.S. Army Aviation Research and Development Command, the program is intended to demonstrate a small turbine engine that meets Army requirements for reliability, low cost, and high performance. The final design calls for an air-cooled rotor with a cast Mar-M247 airfoil shell diffusion-bonded to a PA101 hub. Final-design rotors passed a 6,000-low-cycle fatigue test with the rotor bore maintained at 1,100F and a centrifugal burst test at 131 percent of rated speed.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A084120, price code: A10, or contact project officer Donald S. Monson, (804) 878-5251.

0154 Improved Ceramic for Heat Exchangers: Multicomponent formulation shows promise for automotive gas-turbine engines

National Aeronautics and Space Administration, Washington, DC.

Feb 83 (H)

Many problems remain to be solved in the expanded commercial use of gas-turbine engines in various applications. An important development area involves the selection of suitable materials for heat exchangers. Potential heat-exchanger materials were evaluated. Numerous multiphase compositions were developed and evaluated. Screening tests of various chemistries included specimen fabrication and measurements of thermal expansion, thermal stability, dimensional stability, and corrosion resistance. The most promising composition consisted of mixed oxides of ZrO₂, MgO, Al₂O₃, and SiO₂ and is described generically as ZrMAS. It has been commercially designated as GE-7808. FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report order number: NASA-CR-159678, price code: A03. Inquiries concerning rights for the commercial use of this invention should be addressed to the Patent Counsel, Lewis Research Center, Mail Code: 500-311, 21000 Brookpark Road, Cleveland, OH 44135. Refer to LEW-13068.

0155 Improved Fluidized-Bed Gas Injector: Annular gas flow would cool and protect the injector cone

National Aeronautics and Space Administration, Washington, DC.

Oct 83 (G, H)

A new single-cone gas injector has been proposed for fluidized-bed particle-coating systems. The injector would use a protective annular stream of high-velocity gas to cool the

cone and to reduce or eliminate abrasion by circulating particles. This diluent/fluidization gas would enter at several places around the base of the injector cone or through a continuous annulus. It would then flow toward the apex of the cone, carrying particles into the highly-agitated reaction zone..

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Division, P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO15572.

Instrument Looks Into Jet Engine

See 0457

0156 Lubricating High-Temperature Engines: Reacting gases produce a solid lubricant

Department of Energy, Washington, DC.

Dec 83 (D)

For greater efficiency, automobile engines and gas turbines are being adapted to run at higher temperatures. However, lubricating such engines - in which ceramics will be used for bearing surfaces - presents a problem. A new lubrication scheme provides carbon powder as a lubricant for bearing surfaces at temperatures ranging from 525 to 1,125C. A mixture of carbon dioxide and carbon monoxide gases (such as CO enriched engine exhaust) is introduced into the space around the bearings. When the gas mixture contacts the hot bearing surface, it reacts to produce carbon soot. The reaction is continuous, depositing carbon on the bearings at a rate of about 500 mg/h. The deposit is in the form of a soft film that greatly reduces friction between the bearing surfaces. The deposition process is self-regulating.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,316,921, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

Modifying Exhaust Outlet Reduces Vehicle Operator Exposure to Diesel Exhaust

See 0842

0157 Overheat Prevention in Solar-Powered Stirling Engines: Power output would be regulated according to solar-energy input

National Aeronautics and Space Administration, Washington, DC.

Jan 83 (C, D)

A proposed controller for a solar-powered Stirling engine would prevent the engine from burning up when the energy added by the Sun exceeds that withdrawn by the load. The controller is suitable for point-focus solar engines, in which reducing the input energy by shuttering the Sunlight or bypassing part of the primary working-fluid flow would reduce the engine efficiency.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer, P.O. Box 8757, BWI Airport, MD 21240. Refer to NPO-15069.

Process Developed to Detect Microdefects In Turbine Blades

See 0486

0158 Properties of Nickel-Based Hydrogen-Turbine Blades: Tests on alloys for hydrogen-burning engines of the future are described

National Aeronautics and Space Administration,
Washington, DC.

Jul 83 (D, H)

A report presents data on mechanical properties of cast nickel-based alloys for turbine blades operating in hydrogen and steam at high temperatures. In particular, the document deals with three alloys: single-crystal MAR-M-246+Hf. Properties were measured at 760C and 87C. The alloys have been proposed for use in space propulsion systems operating on high-pressure hydrogen. Described in the report are tensile properties (yield and ultimate strengths elongation, reduction of area, and modulus of elasticity), creep-rupture properties (creep rate, rupture life, elongation, and reduction in area), low-cycle fatigue, and crack growth.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25733.

0159 Regenerative Turboshift Engines: Helicopter engine reduces specific fuel consumption by 25 percent

Army Materiel Development and Readiness Command,
Alexandria, VA.

Apr 83 (D, F)

A study was conducted to identify cycle- and recuperator design parameters of a 500-shp (373-kW) class regenerative turboshift engine, with the objective of obtaining minimum specific fuel consumption at cruise speed; i.e., 40 to 60 percent of intermediate rated power (IRP) and minimum engine weight compatible with helicopter applications. Twenty-seven regenerative engine cycles were evaluated parametrically to determine the proper combination of variables for minimum fuel consumption and weight in typical, lightweight twin-engine military helicopter mission.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A091755, price code: A07.

Roll Forging of Compressor Blades: Blades are produced at lower cost

See 0624

Sterilizable Binder Is Stable at 135 C: Material with few unsaturated double bonds has the needed stability

See 0757

COMMUNICATIONS

0160 Aircraft Antenna Repair Kit: Low-cost field repair takes 30 minutes and costs \$25 per antenna

Army Materiel Development and Readiness Command,
Alexandria, VA.

Aug 83 (D, H)

Fiberglass aircraft antennas with fatigue cracks in the leading and trailing edges of the base can be fixed in the field with a cuff repair kit. Design and evaluation of the fix were conducted for the U.S. Army Aviation research and Development Command. Previously, the repair of defective antennas involved removal of the antenna, shipment to a contractor, and a 5-week aircraft downtime. The repair kit consists of a U-shaped, fiber-reinforced acetate, butyl styrene

cuff; silicone adhesive; replacement base bolts with washers; fiberglass taper pins; and various tools, including a taper-pin torquing tool..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A082932, price code: A02 or contact project officer I. E. Figge, (804) 878-3303.

0161 Audio Distribution and Monitoring Circuit: A versatile circuit accepts and distributes TV audio signals

National Aeronautics and Space Administration,
Washington, DC.

Jun 83 (B)

A distribution and monitoring unit has been built to handle the audio components of television signals. The system includes mixing and drivers for various line levels and impedances. Program material may be simultaneously monitored on three channels. A single-channel version has also been built to monitor transmitted or received signal levels, drive a speaker, interface to building communications, and drive long-line circuits.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20073/TN.

Characterizing Optical-Fiber Waveguides: Textbook discusses methods to evaluate the design and performance

See 0881

0162 Converting Time Signals From BCD to IRIG-B: Nine IC's convert parallel binary-coded-decimal time signals to serial IRIG standard time format B

National Aeronautics and Space Administration,
Washington, DC.

Apr 83 (B)

The coded representation of time signals-day, hour, minute, second-can be changed from the binary-coded decimal (BCD) to the IRIG standard time-code format B by a circuit that uses nine integrated circuits. The input to the code-converter circuit is parallel BCD pulses on a bus: the output is the serial pulses of IRIG-B on a single line.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div., P. O. Box 8757, BWI Airport, MD 21240. Refer to MSC-18963/TN.

0163 Dipole-Excited Ring Antenna: Two-cavity antenna radiates low-side-lobe patterns

National Aeronautics and Space Administration,
Washington, DC.

May 83 (B)

A dipole radiator drives a ring radiator in a new compact C-band antenna. The antenna, which has been breadboarded and tested, can be mounted flush with a surface. Compared with a horn or a parabolic dish with the same aperture, the new ring antenna has greater gain, lower side lobes, and narrower beamwidth. It can be used on vehicles requiring flush-mounted antennas with very directive signals; for example, it could be used as a radar altimeter antenna for an aircraft.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20201/TN.

0164 Evaluating Voice Communication Equipment: A number of tests determine the clarity of voice-communication equipment

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (B, K)

Several methods are available for evaluating the intelligibility of voice-communication equipment, according to a report by the U.S. Army Test and Evaluation Command. The tests include a phonetically-balanced (PB) wordlist test, an automatic voice-intelligibility analysis system (VIAS) test, and a subjective voice-transmission quality test. In the PB wordlist test, specially selected words are transmitted over the test equipment and rated by the numerical percentage -- known as the articulation score (AS). The VIAS consists of voice-analyzer sets, self-check signal generators, and test-signal generators for performing high-speed testing. The procedure for the subjective voice-transmission quality test consists of guide-lines for subjectively rating signal strength (volume, degrading effects of noise, and the overall quality of voice transmission..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A108 138/NAA, price code: A02.

0165 Extending the Line-of-Sight Communications: Communications mirror placed at a high altitude can extend the broadcasting radius to 1,100 km

Department of Energy, Washington, DC.

Apr 83 (B)

A proposed method of extending the broadcasting range of television and radio stations uses a reflecting communications mirror placed at altitudes between 100 and 200 km above the Earth. A ground-based transmitting station bouncing the signals off this mirror can reach audiences as far as 1,100. Costly satellites, rocket launchings, or ground-based relay stations are not used. The antenna is floated up by balloons and kept aloft by electromagnetic radiation pressure beamed at the antenna vertically from the ground. By varying the intensity of the beamed signal, the station operators can control the antenna altitude and therefore the broadcasting radius.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,253,190, for \$1.00 from Commissioner of Patents, Washington, DC 20231. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

Fiber Optic Cable Repair Kit: Simple procedure permits field repair under adverse conditions

See 0247

0166 Fiber-Optic Signal Link: System has high immunity to electromagnetic interference

Army Materiel Development and Readiness Command, Alexandria, VA.

Jul 83 (B)

A system for transmitting electromagnetic-pulse measurements includes a remotely-controlled transmitting unit, a receiving-and-control unit, and two connecting optical fibers of 100-m-length. The system, developed by the Harry Diamond Laboratories, has 130-MHz bandwidth and is insensitive to the high electric fields encountered in electromagnetic-pulse applications. The transmitting unit is controlled via light pulses sent along one of the optical fibers. The unit

receives commands and sends acknowledgements by the same light-emitting diode (LED), which is used in both transmitting and receiving modes.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A087253, price code: A03 or contact project officer, James Blackburn (202) 394-3180.

0167 Flip-Chip Carrier Would Match Microwave FET Impedances: Impedance transformers are part of the mounting and contact strips

National Aeronautics and Space Administration, Washington, DC.

May 83 (B)

A proposed field-effect transistor (FET), roughly 2.5 mm long and 0.6 mm wide, would put out 3.5 watts at frequencies from 12 to 16 GHz. Posts plated onto the source, gate, and drain pads would allow flip-chip mounting to a special carrier. The gate and drain pads would be bonded directly to the carrier at metalized areas that are the proper width and length to serve as impedance-transformer sections of transmission line. Unwanted parasitic impedances are thus eliminated, and the bandwidth of the FET amplifier is greatly improved because the matching starts right at the terminal of the active channel. A patent application has been filed. Inquiries concerning nonexclusive or exclusive license for its commercial development are desired.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: GSC-12442/TN.

0168 Improved Aircraft Voice Communication system: Modern hardware and test procedures are aimed at overcoming the high-noise environment

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (B)

Speech intelligibility has become a prominent factor in modern aircraft voice communication systems. A study by the U.S. Army Aviation Research and Development Command reviews the improvements in one modern Army aircraft voice communication system and in the test procedures updated to meet the new standards. One improvement in the new system is the bandwidth expanded from the standard 300- to 3,000-Hz range to 300- to 4,500-Hz range. The addition at the high-frequency end makes the consonants more intelligible. More realistic test procedures are speeled out to assess pink-noise attenuation at the ear-cups and microphone noise cancellation. The conventional test procedures have all but ignored the noisy environment in the aircraft cockpit..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A119 427/NAA, price code: A02 or contact project officer Mitchell S. Mayer (201) 544-2302.

0169 Intercom for Noisy Environments: System allows digital transmission by wire or infrared radiation

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 (B)

A report describes tests of a brassboard intercommunication system for tracked vehicles. The system, which was developed for the U.S. Army Communications Research

and Development Command, employs time-division multiplexed signaling between crew stations with continuously-variable slope delta modulation and infrared radiation for wireless transmission. The testing was qualitative in nature, with voice clarity and background noise levels being the prime concerns. The brassboard system performed with very little background noise, even in vehicles operating at high rates of speed, and provided clear, intelligible communication. The conclusions: the system performs well in tracked vehicles, provides the noise immunity of digital signaling, and reduces cabling requirements.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A087830, price code: A02.

0170 Measuring Antenna Factor of Electrically Small Antenna's

Department of Commerce, Washington, DC.

May 83 (B, K)

A compact, simple, and inexpensive method of measuring the antenna factor of electrically small antennas has been developed. Antenna factor is a transfer function that converts received signal level to field strength. The method utilizes a loop cell capable of generating known fields, over a physically small antenna aperture, that are accurate in the frequency range from 0.25 MHz to 1000 MHz. The loop cell uses two intersecting metal sheets joined at a 36 degree angle. Further refinement should improve the accuracy to within 1 dB.

FOR ADDITIONAL INFORMATION: Contact: R.G. FitzGerrall, Division 723.04, National Bureau of Standards, Boulder, CO 80303.

0171 Method and Article of Manufacturing an Optical Fiber Connector

Department of Navy, Washington, DC.

Feb 83 (F, *Nitinol)

A new invention relates to a method and device for mechanically connecting single fibers by use of a nickel-titanium composition alloy. The recent application of fiber optic technology to the communication field has required the solution of many unique problems inherent in installing and connecting small diameter fiber optical waveguides such as of the order of 5 mils in diameter. A new connector consists of fabricating a sleeve made of the metal 'NITINOL' with an inner core diameter slightly less than the outer diameter of the fibers to be coupled. The sleeve is heat treated to establish a memory of the dimensions, and is then cooled to a temperature below its transition temperature. The sleeve is then mechanically expanded to a diameter greater than the diameter of the fibers to receive the respective ends. Cable ends are self-aligned along the sleeve axis and are firmly maintained in the self-aligned orientation.

FOR ADDITIONAL INFORMATION: A copy of this patent, PATENT 4, 261,644, is available for \$1.00 from the Commissioner of Patents, Washington, DC 20231. For information concerning licensing this invention, contact: Mr. Walter Perkins (Code 013), Naval Ocean Systems Command, San Diego, CA 92152.

0172 Optical-Fiber Instrumentation Link: Modal noise is reduced by special provisions

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 (B)

A fiber-optics transmission system carries analog instrumentation signals over a 1-km length of fiber. The system, which was developed by the Harry Diamond Laboratories, has a bandwidth extending from 5 kHz to 220 MHz with a dynamic range of about 35 dB. Special attention was given to minimizing the modal noise produced by the single-mode laser source. The basic concept of the system is extremely simple. A continuous-wave laser diode is biased to an optimum value for linearity and modulated by the applied signal. The resulting amplitude-modulated signal is transmitted to a remote point by an optical fiber. The signal is then detected and demodulated by a silicon diode, amplified, and made available at an output connector.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A087552, price code: A02 or contact project officer James C. Blackburn (202) 394-3180.

0173 Optical-Fiber Pulse Shaper: Electronic or optical pulses of arbitrary shape are easily generated

Department of Energy, Washington, DC.

Jun 83 (B)

A new waveform synthesizer employs an array of optical-fiber delay lines to change the shape of a light pulse. A large variety of input-pulse shapes is available, and optical fibers can be conveniently grouped in any of numerous combinations of different lengths. Consequently, the shape of the output pulse can be varied almost at will. The number of fibers of each length can be chosen to obtain the desired amplitude as a function of delay time.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,296,319, which is available from: Commissioner of Patents Washington, DC 20231 for \$1.00. For licensing information, Contact: Office of Assistant General Counsel for Patents U.S. Department of Energy Washington, DC 20585.

0174 Optical-Fiber Signal Link: A general-purpose 500-MHz-bandwidth unit is suited for high-noise environments

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 (B)

Wideband instrumentation signals are transmitted and received through an optical fiber by a transmitter/receiver combination developed at the Harry Diamond Laboratories. Signals as low as millivolts are transmitted without interference, and the fiber link provides complete electrical isolation up to megavolts. The transmitter is controlled through a digital time-multiplexed two-way optical-fiber channel from a control unit at the receiving location. From the control unit the operator turns the entire system on and off, switches a calibration signal generator at the transmitter, or selects an input-signal generator at the transmitter, or selects an input-signal attenuation level between 0 and 45 dB.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A105118, price code: A03 or contact project officer James C. Blackburn (202)394-3180.

0175 Producing Ruggedized Fiber-Optic Cable:

Fabrication progress and test results are reported

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 (B, G)

An automated process for producing a ruggedized fiber-optic communication cable from high-numerical-aperture (NA) fibers has been evaluated. A published document reports the results of the process and of preliminary test samples. This work, which is one of the series reported on this particular cable, is being performed for the U.S. Army Communications Research and Development Command. The major topics covered include the cable process optimization, the use of the fabrication facility, and cable performance at low temperatures.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A105717, price code: A04 or contact project officer Robert Kopstein (201) 532-7009.

0176 Production-Line Testing of Oscillator Sensitivity: Effect of reflected signal is simulated in a small test chamber

Army Materiel Development and Readiness Command, Alexandria, VA.

Jan 83 (B, G, K)

The sensitivity of proximity-sensing radio oscillators can be measured on the production line by the use of a small anechoic test chamber. The technique was developed at the Harry Diamond Laboratories. It replaces the pole test as the standard sensitivity-measurement technique. Its error is estimated to be no more than 10.4 percent.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A097440, price code: A04 or contact Project officer Neil D. Wilkin (202)394-2755.

0177 Safety Evaluations of Communications Equipment: Guidelines are presented for identifying electrical, mechanical, and other hazards

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 (B)

A report provides guidance for evaluating potential hazards in electronic equipment and systems for communications. Safety check-lists, physical tests, observations, and examinations are presented for use by test personnel. The intent of the evaluation is to identify and contain electrical, electromagnetic-radiation, mechanical, and miscellaneous hazards to ensure that safe test procedures are followed. The report, which was prepared for the U.S. Army Test and Evaluation Command, covers instrumentation, preparation for testing, test controls, and performance tests.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A103808, price code: A02.

0178 Short-Range Two-Way Radio in a Hardhat: Unit allows voice communication in an extremely noisy environment and protects the user's hearing

Army Materiel Development and Readiness Command, Alexandria, VA.

Jan 83 (B, E)

Four different communication systems for high-noise-level environments are described and evaluated in a report prepared by the Harry Diamond Laboratories. Each of the units consists of a voice-activated radio transmitter and a pair of earphones mounted in a hardhat of the sort worn by industrial workers. In field tests aboard an offshore oil rig where the noise level greatly exceeded the hazardous level of 85 dBA, the equipment protected the user's hearing from damage by the ambient noise and allowed effective communication.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report order number: AD-A099577, price code: A02 or contact project officer Edwin H. Harrison (202)394-2755.

0179 Small-Phase-Scan Microwave Antenna: Beam-pointing angle is changed with a simple phase shifter

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 (B)

An experimental multiple-line-source microwave antenna has shown promise as an inexpensive angular scanner for radar or other system. Designed and built by the U.S. Army Electronics Research and Development Command, the antenna operates at 32 to 36 GHz, requiring only a pulsed current source to control the scan. The antenna is built into a rectangular-cross-section metal box having the internal dimensions of a standard RG-96 waveguide. Fifteen radiating slots are cut into one of the short sides. Inside, ferrite toroids lie along a longitudinal axis. Each toroid is loaded with a high-permittivity dielectric core and coupled with dielectric transformers on either end.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A104 429/NAA, price code: A02 or contact project officer Richard Stern (201) 544-4666.

A System for Testing Optical Fibers: Cerenkov light pulses generated in an optical fiber are used to determine the transmission characteristics per unit length of the fiber

See 0496

0180 Tests of Short-Distance Optical Communication Equipment: Data links performed satisfactorily

Army Materiel Development and Readiness Command, Alexandria, VA.

Oct 83 (B)

The utility of a few optical-fiber transmission systems as short-distance (up-to- 100-m), communication links was demonstrated in tests performed by the U.S. Army Communications-Electronics Command. Systems of this type are increasingly sought because the fibers are electrically non-conductive and neither receive nor transmit electromagnetic interference in the radio portion of the spectrum. These attributes also increase the flexibility of equipment layout. A 4-kHz analog voice link, a 1.544-Mb/s data link, and a 12.6-Mb/s data link were each constructed in two versions: a fiber-optic cable system with modulator/demodulator (modem) units and a conventional metallic-cable system. Further development has been recommended to include fiber-optic transmitters and receivers as standard equipment in pulse-code-modulated multiplexers, channel banks, digital radios, and digital data-processing equipment.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A103525, price code: A05 or contact project officer Mel Sarson (201) 532-7923.

0181 Throw-Away Radio: A throw-away portable radio can be fabricated at approximately one-fourth the cost of a similar, fully militarized unit

Army Materiel Development and Readiness Command, Alexandria, VA.

Jul 83 (B)

The feasibility of designing a low-cost, throw-away, hand-held transceiver for noncritical mission assignments was demonstrated by the U.S. Army Communications Research and Development Command. At present, a commercially-developed, military-grade portable transceiver operating in the frequency range of 30 to 80 MHz costs \$2,000; the proposed unit would cost one-fourth that and operate between 220 and 230 MHz. The main objectives of designing a throw-away radio were (a) low-cost, synthesized multiple channels and (b) small size. A preliminary cost estimate for the electronic components to build a single radio is \$220; the cost of a complete radio with case is estimated at \$500, based on a production quantity of 1,000 to 10,000 units.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A092717, price code: A03, or contact project officer Joseph Lee (201) 535-4262.

0182 Ultra-Low-Loss Optical-Fiber Cable: Data-transmission cable will withstand severe environments

Army Materiel Development and Readiness Command, Alexandria, VA.

Jul 83 (H)

Progress in the development of optical-fiber cable assemblies for tactical field use is summarized in a report of the U.S. Army Communications Research and Development Command. The design objectives include low-loss (<8 -dB/km) transmission of data at 20 Mb/s over 8 km without repeaters. Although designed to military specifications, the cables have obvious commercial and industrial potential for data, television, and voice transmissions in harsh or hazardous environments. Experimental six-fiber cables were fabricated. A report lists the results of tests performed on the cables, including the resistance to impact, bending, twisting, and tensile load; attenuation; dispersion; temperature/humidity effects on attenuation; and susceptibility to fungus growth.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A087517, price code: A05 or contact project officer John W. Strozyk (201) 544-4959.

0183 Underwater Acoustic Telemetry System: System has a large enough operating angle to transmit data between a submerged package and an anchored buoy

Department of Energy, Washington, DC.

Oct 83 (B, K)

A high data-rate acoustic telemetry system has been modified to increase the total included angle of its conical beam, in a vertical transmission mode through the water, from 70 degrees to 145 degrees. Acoustic telemetry provides wireless communication between subsurface ocean-

instrumentation systems and surface receiving and recording equipment. The data-modulation method used is frequency shift keying (FSK); i.e., one acoustic frequency is transmitted for a binary data bit of one and another is transmitted for a binary zero. The tests have demonstrated the system capable of reliably transmitting data vertically through the water out to a total included angle of 145.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-012021, price code: A03.

0184 Welder for Fiber Optics: Welder produces low-loss optical-fiber junctions

Department of Energy, Washington, DC.

Jun 83 (F, G)

A portable apparatus for welding optical fibers includes a very accurate fiber-alignment unit and a diffuse arc welder. The fibers are aligned collinearly in a vertical direction and joined by the arc. Because of the precise alignment, the resulting junctions have a relatively-insignificant transmission loss, consistently below an eighth of a dB. The key to the precise fiber alignment is the use of a vertical fiber orientation, rather than the imprecise horizontal orientation used on some welding equipment.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,266,852, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1.00. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

0185 A Whole-Mine Medium Frequency Radio Communication System

Bureau of Mines, Washington, DC.

Feb 83 (B)

A radio communications system was designed which takes advantage of existing mine wiring such as telephone lines or electric power cables. The existing wiring distributes radio signals throughout the mine, making communications possible between roving miners, vehicle operators, dispatchers, and other personnel. Research has shown that medium frequency (MF) signals (300 KHZ-3 MHZ) can couple onto and re-radiate from nearby conductors. The personnel transceivers are of a unique vest design.

FOR ADDITIONAL INFORMATION: Contact: Mr. Harry Dobroski, Bureau of Mines Pittsburgh Research Center, P.O. Box 18070, Pittsburgh, PA 15236; (412) 675-6692.

COMPUTER TECHNOLOGY & SOFTWARE

0186 Advanced Instructional System

Department of the Air Force, Washington, DC.

Jul 83 (A)

The Advanced Instructional System (AIS - 1972-1978) was a major technological innovation which significantly improved the efficiency of technical training. The AIS was a computer-based multimedia system for the administration and management of individualized technical training on a large scale. Following the end of the development project in 1978, the prototype AIS technology was extensively modified, and demonstrated in a variety of training situa-

tions. Two significant observations from these demonstrations were: that AIS had wide application outside the technical training environment; and, its use was constrained by the original hardware/software implementation. The AIS is currently being widely demonstrated in the Air Force, Department of Defense, and other organizations.

FOR ADDITIONAL INFORMATION: Contact: Dr. Joe T. Hazel, AFHRL/AZ (ORTA), Brooks AFB, TX 78235; (512) 536-3426.

0187 Analysis of Feedback-Control Systems, Reduced-order feedback-control equations are obtained for use in time and frequency-domain analysis

National Aeronautics and Space Administration, Washington, DC.

May 83 (A, B)

BLOCK IT implements an algorithm that obtains reduced-order feedback-control equations for use in both time and frequency-domain analysis. In a more general context, BLOCK IT computes a real nonsingular similarity-transformation matrix that reduces a real nonsymmetric matrix to block-diagonal form, each block of which is a real quasi-upper triangular matrix. The program is tailored to meet the needs of the analyst requiring reduced-order dynamic models for feed-back-control analysis. BLOCK IT is written in FORTRAN IV for batch execution and has been implemented on an IBM 370-series computer.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to GSC-12723/TN.

0188 Atmospheric Correction for Remote Sensor Data: Model includes the effects of scattering by gas and aerosols and absorption by ozone

National Aeronautics and Space Administration, Washington, DC.

Feb 83 (A, K)

In the remote sensing of surface features using multispectral sensors, Earth's atmosphere can have adverse effects on the classification of various surface objects. It is therefore desirable to remove the effects of the atmosphere from the multispectral data prior to the implementation of classification processing techniques. A computer model of those atmospheric effects has been developed for the purpose. The mathematical model is based on radiative transfer theory as applied to plane parallel, horizontally spatially homogeneous, isotropic atmosphere. This program is written in FORTRAN V language for use on a UNIVAC 1100 computer.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to LEW-13344.

Automated Information Directory Systems (AIDS): Determine optimum bus and/or subway routing for riders

See 0911

Biomass Model of Reservoir Fish and Fish-Food Interactions

See 0032

Biomass Model of Reservoir Fish and Fish-Food Interactions

See 0129

0189 CAMAC Interface to the Apple Computer:

CAMAPPLE interface adds a new tool to the spectrum of dedicated computers available for high-energy physics hardware development

Department of Energy, Washington, DC.

Jul 83 (A, J)

A new interface provides access to the Apple computer from the CAMAC bus, which is the current standard instrumentation bus for high-energy physics experiments at the Stanford Linear Accelerator Center. The advent of the personal microcomputer provides a new tool for debugging, calibration, and the monitoring of small-scale physics apparatus. With an appropriate interface the microcomputer becomes a low-cost (1/3 the cost of minicomputer system), convenient, dedicated, portable system, which can be used in a manner similar to that of portable oscillators. The interface allows access to the CAMAC-based data, which is generated in a test laboratory or test bench.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE81-025146, price code: A02.

0190 Computer Generated Plotter Graphics: A guide shows how to generate various charts using plotter-graphics programs

Department of Energy, Washington, DC.

Jul 83 (A)

A training manual has been developed that includes explanations of several graphics programs that use a conversation-monitor-system (CMS) terminal and a table-top plotter to produce a copy on bond paper or transparency film. The plotter-graphics programs, which are designed to produce different charts with a minimum of user effort, include: Mountain Chart, Pie Chart, Bar Chart, Mulbar Chart, Transparency, Label, and Gantt Chart. A total of 13 charts were produced using these programs.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: BDX-613-2611, price code: A05.

Computerized Biomedical Man-Model

See 0054

A Computerized Water Management Tool: The instream flow incremental methodology

See 0130

0191 Computing Graphical Confidence Bounds: An approximation formula is easily computed on a programmable calculator

National Aeronautics and Space Administration, Washington, DC.

Jun 83 (D, J)

A new approximation for graphical confidence bounds is simple enough to run on a programmable calculator. The approximation can be used in lieu of numerical tables, which are not always available, and exact calculations, which often require rather sizable computer resources. The approximation has been verified for a collection of up to 50 data points. Confidence bounds define the limits within which a data set can be assumed to fit a particular statistical distribution- for example, a normal distribution. If any data point falls outside the confidence bounds, then the assumption of distribution normality is rejected. This method has been used to analyze tile-strength data on the Space

Shuttle thermal-protection system. The efficiency of the approximation can reduce labor and computer costs of statistical analyses in other applications.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB83-925406, price code E02.

Costs and Benefits of Advanced Aeronautical Technology: Programs determine the advantages and disadvantages of advanced technology applied to civil aircraft

See 0006

Cube-Corner Retroreflector Modeling: Programs compute impulse-response and interference effects of reflected pulses from optical cube corners

See 0885

0192 Data-Retrieval System: An interactive system for data retrieval by management

National Aeronautics and Space Administration, Washington, DC.

Mar 83 (A)

Data retrieval for management has always posed a complex problem. The NASA Graphics and Display System (NGDS) helps to solve the problem of data retrieval for management. Since NGDS is a flexible command/control language that is very versatile in its data-selection and display capabilities. The basic display graphics supported are line plots, bar charts, pie charts, and tables. A unique feature of NGDS is that it is data-independent. NGDS is written in COBOL and FORTRAN and has a central memory requirement of approximately 300K 8-bit bytes.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to HQN-10921/TN.

0193 Displaying Geographically-Based Domestic Statistics: Interactive system transforms tables of statistics into color-coded maps

National Aeronautics and Space Administration, Washington, DC.

Feb 83 (A)

The Decision Information Display System (DIDS) is a rapid-response information-retrieval and color-graphics display system. DIDS transforms tables of geographically-based domestic statistics (such as population or unemployment by county, energy usage by county, or air-quality figures) into high-resolution, color-coded maps on a television display screen. It offers the user a wide variety of information-display options. The DIDS package includes a host system version and a remote system version. The host version is written in FORTRAN IV-PLUS and Assembler for interactive execution on a DEC VAX 11/780 computer running the VMS Version 2.0 operating system.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to GSC-12747.

0194 Distributed Intelligence Computer Data Acquisition system Using CAMAC (Computer Assisted Measurement and Control) Interfaces

Department of Energy, Washington, DC.

May 83 (A)

A method of acquiring data through CAMAC interfaces which are microcomputer driven and operated by a mini-computer host has been developed, A PDP-11 minicom-

puter RSX11 system with several megabytes of disk storage is being used to control LSI-11 microcomputers which acquire data. Distributing the tasks among the LSI-11s frees the host PDP-11 for doing calculations and communications. Since the LSI-11s run a subset of the PDP-11 instruction set, programming is simplified. Tasks can be built on the PDP-11 for execution on the LSI-11s. Applications include scientific or industrial data acquisition and process control where it is desirable to control and evaluate many processes using one host minicomputer.

FOR ADDITIONAL INFORMATION: Contact: D.W.Jared, Oak Ridge National Laboratory, P.O. Box X, Oak Ridge, TN 37830; (615)574-4192, request support package 455/X/TN.

0195 Driver for DISSPLA plotter: A driver for plotter, microfilm, microfiche, and terminal graphics

National Aeronautics and Space Administration, Washington, DC.

Oct 83 (A)

DISPLOT is a generalized outside driver for the commercially-available DISSPLA (Display Integrated Software System and Plotting Language) plotting system. The DISPLOT program provides the user with a simple-to-use graphics capability with a great deal of application flexibility. DISPLOT is independent of whatever program generates the data to be plotted. DISPLOT may be used for the generation of plotter, microfilm microfiche, and terminal plots. DISPLOT is written in FORTRAN V and Assembler for batch execution and has been implemented on a UNIVAC 1100-series computer.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to MSC-20290/TN.

Dynamic Rating Curve Model (DYNMOD)

See 0825

Dynamic Wave Operational Model (DWOPER)

See 0826

Estimating Insolation Incident on Tilted Surfaces: Solar radiation on several types of solar collectors is calculated from ASHRAE relationships

See 0330

Expert Computer Program Overhauled

See 0783

0196 Fabricating a Microcomputer on a Single Silicon Wafer: Proposed fabrication would reduce microcomputer packaging costs

National Aeronautics and Space Administration, Washington, DC.

Jul 83 (A, B, G)

A concept for a 'microcomputer on a slice' would reduce microcomputer costs by eliminating the scribing, wiring, and packaging of individual circuit chips. All components for a microcomputer--central processing unit, input/output circuitry, read-only memory, and random-access memory (CPU, I/O, ROM, and RAM)--would be placed on a single silicon wafer. In the concept, microcomputers would be smaller because external wiring on circuit boards is unnecessary. They would also be less expensive because the cost of individual handling of chips would be avoided.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15053.

0197 First Validated Implementation of the ADA Programming Language Is Released

Department of Defense, Washington, DC.

Oct 83 (A)

The Ada Joint Program Office (AJKPO) of the U.S. Department of Defense has released the first validated implementation of the Ada programming language. A translator/interpreter, named Ada/Ed, was developed by the Courant Institute at New York University under contract to the Center for Tactical Computer Systems (CENTACS) at the U.S. Army Communications and Electronics Command, Fort Monmouth, New Jersey. The Translator is a complete implementation of ANSI Ada (MIL-STD 1815A, Feb. 1983) and serves as an operational semantic definition of the language. The Translator will also serve as an aid in Ada training programs due to its extensive error message facility and syntax and semantic checking provisions. The translator/Interpreter translates Ada source programs into an intermediate code which is then executed in an interpretive mode. ANSI Ada/Ed is designed to execute on a VAX-11/750-780 system under the VMS operating system (Version 3.0) and requires at least two megabytes of memory.

FOR ADDITIONAL INFORMATION: Contact: Office of Data Base Services, NTIS, Springfield, VA 22161; (703) 487-4808. Refer to AD-A128707.

Flexible Aircraft Takeoff and Landing Analysis: Program includes maneuver logic and autopilots for glide slope flare, landing, and takeoff

See 0010

Flexible Method for Analyzing Band Recovery Data

See 0785

Flow Distribution in Hydraulic Systems: Program solves fixed or variable flow problems for series, parallel, or series/parallel systems

See 0906

0198 FORTRAN Static Source Code Analyzer: Program determines an overall 'figure of complexity' for FORTRAN programs

National Aeronautics and Space Administration, Washington, DC.

Jul 83 (A)

The program (SAP) automatically gathers and reports statistics on the occurrences of statements and structures within a FORTRAN program. Provisions are made for weighing each statistic, providing the user with an overall figure of complexity. Statistics, as well as figures of complexity, are gathered on a module-by-module basis. Overall summed statistics are also accumulated for the complete input source life. SAP accepts as input syntactically-correct FORTRAN source code written for the DEC PDP-11/70 FORTRAN IV Plus compiler or the IBM S/360 FORTRAN IV Level H compiler. SAP is written in FORTRAN IV for batch execution.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602; Refer to GSC-12693.

0199 Guidance for Numerical Software Users: Software for scientific problems is rated, and programs that make software more accessible are described

Department of Energy, Washington, DC.

Aug 83 (A)

A pair of documents provides guidance on using numerical software. One describes a package of two transportable

FORTRAN programs for computer-aided decision trees. The other documents contains information about available numerical routines designed to assist computer users in the solution of scientific problems. The document is organized by problem area. Among the many problems areas discussed are approximation of special functions, complex arithmetic, curve and surface fitting, determinants, eigenvalues and eigenvectors, minimizing and maximizing a function, and random number generation.

FOR ADDITIONAL INFORMATION: Contact: Dr. P.W. Gaffney, Oak Ridge National Laboratory, P.O. Box Y, Oak Ridge, TN 37830; (615) 574-0630.

0200 Hardware Fault Simulator for Microprocessors: A breadboarded circuit is faster and more thorough than a software simulator

National Aeronautics and Space Administration, Washington, DC.

Nov 83 (A, B)

A fault simulator built in hardware for a commercially available microprocessor operates twice as fast as a comparable simulator implemented in software. According to test for 'stuck' faults more quickly and more efficiently by using the fault-simulator circuit. Designers of fault-test circuits should consider a hardware approach where speed is more important than the cost of parts and where there are facilities available for breadboarding and testing the circuits.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15080/TN.

0201 High-Speed Data-Sampling System: Charge-coupled device delay lines are used in a 10-MHz sampler with 12-bit accuracy

Army Materiel Development and Readiness Command, Alexandria, VA.

Aug 83 (A, B)

A study in data-sampling hardware has demonstrated the feasibility of using charge-coupled device (CCD) shift registers to sample and store analog data in high-speed systems. Development and evaluation of the CCD fast sampler was conducted for the U.S. Army Communications Research and Development Command. The sampling system employing CCD consists of an input buffer, clock drivers, an output buffer, a 12-bit analog-to-digital converter, and circuitry for timing and control logic. A microcomputer with CRT display, printer, and waveform generator was used to perform system control and data-processing functions.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A085331, price code: A05.

Implementing Exclusive-OR Logic: A basic four-input XOR is assembled from one decoder and one NAND gate

See 0253

Instream Water Temperature Model

See 0835

0202 Interactive Planning System: System helps managers plan projects within time, budget, and manpower constraints

National Aeronautics and Space Administration, Washington, DC.

May 83 (A)

The NASA Interactive Planning System (NIPS) supports resources analysis and tracking and long-range resources planning. NIPS is based on a hierarchical-tree data-base structure and remote graphics terminal input and output. It assists the program-planning groups at NASA Headquarters in developing long-range plans for the total space effort. These functions involve meeting goals and objectives within time, budget, and manpower constraints. It is a general tool that could be adapted to any resource-management and allocation problem. NIPS is written in FORTRAN and COMPASS for the RUN compiler and has been implemented on a CDC 6000-series computer using the SCOPE operating system.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to GSC-12723/TN.

0203 Life Sciences MIS: An interactive system utilizing form-fillout capability

National Aeronautics and Space Administration, Washington, DC.

Nov 83 (A)

The Management Information System, MIS, provides the Life Sciences Projects Division at Johnson Space Center with an automated system for project management. NASA has found that a disciplined goal-oriented program is the only effective approach in meeting launch dates with confidence. In building a data base to support a goal-oriented program, the project schedule becomes the focal point around which all other information revolves; i.e., cost, open items, problems, and narrative status. MIS is written in VAX COBOL and FORTRAN for interactive execution on the DEC VAX-11/780.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to MSC-20238/TN.

Loads and Pressures on Axisymmetric Bodies with Cruciform Fins: Program computes forces and moments on supersonic configurations experiencing pitch and roll

See 0016

0204 Manpower Allocation and Reporting: Interactive program handles data for up to 75 projects and allocations for up to 60 months

National Aeronautics and Space Administration, Washington, DC.

Apr 83 (A)

The interactive Manpower Allocation and Reporting System (MARS) helps planners make manpower allocation decisions. MARS includes provisions to enter overall constraints for projects and persons, to assign individuals to projects, to compute automatically the overhead category, to report on deviations from constraints, and to generate manpower resource allocation reports. The MARS data base may contain data for up to 75 projects, 75 people, and manpower allocations for 60 months. Three basic types of reports may be generated: A manpower report, a person or project list report, and constraint reports.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, University of Georgia, Athens, GA 30602; (404) 542-3265. Refer to GSC-12708/TN.

0205 Microcomputer Information Exchange Has Been Established

Department of Commerce, Washington, DC.

Oct 83 (A)

An electronic bulletin board which will enable users to exchange information and read bulletins on microcomputer-related topics has been established by the NBS Institute for Computer Sciences and Technology (ICST). Information on topics such as conferences, seminars and workshops, telecomputing services, user and special interest groups, other electronic bulletin boards, publications, and new products and technology will be available. Users will be able to update the information and recommend additional entries. Both federal and non-federal users who have the appropriate terminal capability (ASCII, 300 baud, 8 data bits, no parity, 1 stop bit) will be able to reach the exchange.

FOR ADDITIONAL INFORMATION: Contact: John Junod or Lynne Rosenthal, National Bureau of Standards, Technology Building, B266, Washington, D.C. 20234; (301) 921-3485.

Microcomputer Simplifies Weighing of Crop Insurance Benefits

See 0042

0206 Microcomputer Trainer: A complete microcomputer is housed in a briefcase

Department of Energy, Washington, DC.

Jan 83 (A)

A computer, portable microcomputer called the MST-80B is designed for instruction in the fundamentals of microcomputers. This system, mounted in a briefcase, provides the user with hands-on experience in state-of-the-art microcomputer architecture, programming, interfacing, and application design. The trainer uses the Intel 8080A 8-bit microprocessor as its central-processing unit, along with supporting integrated circuits.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: UCID-17526(REV 2), price code: A03 or for information not provided in the report contact Clara Harrison, Lawrence Livermore National Laboratory, P.O. Box 808, L-699, Livermore, CA 94550; (415) 422-1232.

0207 NAMELIST Preprocessor: FORTRAN code is modified for use with the F4P compiler

National Aeronautics and Space Administration, Washington, DC.

Oct 83 (A)

The program, NPP, provides the DECPDP-11/70 with capabilities identical to the IBM FORTRAN IV NAMELIST feature. The preprocessor modifies the FORTRAN code that contains NAMELIST statements acceptable to the IBM FORTRAN IV compiler to generate an equivalent code that is acceptable to the PDP-11 FORTRAN IV-Plus (F4P) compiler. NAMELIST provides the FORTRAN programmer with additional, flexible input and output capabilities. This feature is particularly useful in the area of data input because NAMELIST data are input in the form of the variable symbolic name being set equal to a constant value, similar to a standard FORTRAN statement. This allows the user to review input data readily and relieves the user from having to place data in certain columns and formats as required in formatted READ statements.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to GSC-12704/TN.

NASTRAN(R): April 1982 Release

See 0893

0208 Navy Learning Software Teaches Technical Reading

Department of the Navy, Washington, DC.

Mar 83 (A)

A computer software learning program developed by the Navy Personnel Research and Development Center (NPRDC) Adult and Continuing Education. Programs designed to the vocational and life skills learning needs of the students in adult schools. Created to teach vocabulary and literal comprehension, the program is unusual in that it can be used to enhance these skills in any content area. It is also applicable for training students in English as a second language.

FOR ADDITIONAL INFORMATION: Contact: Navy Technology Transfer Fact Sheet, Code E411, Naval Surface Weapons Center, Dahlgren, Virginia 22448. Refer to 071001/TN.

0209 Network Modeling Software

Department of the Air Force, Washington, DC.

Dec 83 (A, D, G)

The systems analysis or integrated networks of tasks (SAINT) simulation language and computer programs are presently used to academia, industry, and government agencies and in a number of countries. The modeling concepts employed have been validated and software has been tested and validated. SAINT is a combined discrete-continuous, process oriented, activity on node, network modeling, and simulation technique for the analysis and design of large, complex man-machine systems. It is applicable to a broad class of problems--those in which discrete and/or continuous elements are modeled and the behavior exhibits time varying properties.

FOR ADDITIONAL INFORMATION: Contact: Robert F. Baehert, AFAMRL/HEC, Wright-Patterson AFB, OH 45433, (513)255-3438.

New 3-D Robot Vision System

See 0597

NIDR/FDA Microbial Information System

See 0800

0210 Operations Program Executive: System simplifies job control, data management, and recordkeeping for interacting programs

National Aeronautics and Space Administration, Washington, DC.

Feb 83 (A)

The Ground Resource Operations Program Executive (GROPE) is a control program for binding a system of programs into a single, easily operated entity. It relieves the user from the complexities arising from the decomposition of a large application into a number of interacting program units. Many large-scale computer applications are too large to be encompassed by a single computer program. GROPE is an interactive executive program that communicates with the user through a set of menus and simple prompter questions. A Programmer describes each system of programs to GROPE in terms of this model. Once this has been accomplished, engineers and other users who are not programmers can easily set up, execute, and save the results of complex

series of interacting analysis programs. GROPE is written in FORTRAN IV for interactive execution.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to MFS-25628.

0211 Optimal Regulator Algorithms for the Control of Linear Systems: A rigorous tool for designing multi-input/multi-output control systems

National Aeronautics and Space Administration, Washington, DC.

Jun 83 (A, B)

A control-theory design package, called Optimal Regulator Algorithms for the Control of Linear Systems (ORACLS), aids in the design of controllers and optimal filters for systems that can be modeled by linear, time-invariant differential and difference equations. ORACLS is particularly attractive because it is a rigorous tool for dealing with multi-input and multi-output dynamic systems in both continuous and discrete forms. Optimal linear quadratic-Gaussian (LQG) problem, has become the most widely accepted method of determining optimal control policy. ORACLS is a collection of subroutines that can be used to formulate, manipulate, and solve various LQG design problems. The ORACLS routines are written in FORTRAN IV for batch execution. Both CDC and IBM versions of the code are available.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to LAR-12313/TN(CDC) and LAR-12953/TN(IBM).

0212 Out-of-Core Solutions of Complex Sparse Linear Equations: Routines assume no special properties of the coefficient matrix other than nonsingularity

National Aeronautics and Space Administration, Washington, DC.

Mar 83 (A, J)

ETCLIB is a library of subroutines for obtaining the out-of-core solutions of complex sparse linear equations. The routines apply to dense and sparse matrices that are too large to be stored in core. They are therefore useful for solving any set of linear equations, but are particularly useful in cases where the coefficient matrix has no special properties that guarantee convergence with any of the iterative processes. The routines are written in FORTRAN IV and Assembler for batch execution.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to LAR-12874.

0213 Path Pascal: Pascal is extended to treat real-time concurrent systems

National Aeronautics and Space Administration, Washington, DC.

Apr 83 (A)

Path Pascal is a high-level experimental programming language based on Pascal, which incorporates extensions for systems and real-time programming. Developed to investigate the benefits and problems that arise when path expressions are combined with a high-level language to provide a system programming tool, Path Pascal includes objects of information encapsulation, path expressions for synchronization of processes that execute independently, and provisions for coding interrupt processes to deal with I/O devices. The language also includes abstract data and protection features.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, University of Georgia, Athens, GA 30602; (404) 542-3265. Refer to LAR-12854/TN.

0214 Person-Job Match Technologies

Department of the Air Force, Washington, DC.

May 83 (F)

To assist the Air Force in selecting, classifying, and assigning personnel to work activities to maximize effectiveness, a person-job matching system was developed. A computer-based system for offering Air force enlisted jobs to applicants was developed and implemented. The system is called the Procurement Management Information system (PROMIS). PROMIS was designed to combine information about people and jobs in a way that will produce a 'value indicator' about each person-job combination. This value indicator reflects one or more decision makers' policy about the value of each person's classification to each job. The concepts in PROMIS can be applied to any personnel actions such as initial selection, geographical assignments, retraining, promotions, and dismissals.

FOR ADDITIONAL INFORMATION: Contact: Dr. Joe Hazel, Air Force Human Resources Lab, Brooks AFB, TX 78235; (512) 536-3426.

0215 Photovoltaic Ferroelectric Nonvolatile Memory: New memories could be superior to present charge/storage types

Army Materiel Development and Readiness Command, Alexandria, VA.

Jan 83 (A, B)

The feasibility of proposed photovoltaic ferroelectric digital memories has been demonstrated in experiments by the Harry Diamond Laboratories. The new memory cells would function in two-dimensional matrices as nonvolatile read/write random-access memories (RAM's) or as electrically-alterable programmable read-only memories (EPROM's). Successful preliminary test were conducted with an element of PZT-5A, a polycrystalline solid solution ceramic of lead zirconate and lead titanite.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A099516, price code: A03 or contact project officer Philip S. Brody (202) 394-1551.

Pipe Heat Transfer Calculation

See 0082

0216 Project Planning and Reporting: Projects with up to 10,000 activities can be planned, scheduled, and monitored

National Aeronautics and Space Administration, Washington, DC.

Feb 83 (A)

The Project Planning Analysis and Reporting System (PPARS) is an automated aid in the monitoring and scheduling of activities within a project. The PPARS system consists of the PPARS Batch Program, five preprocessor programs, and two postprocessor programs is a full CPM (Critical Path Method) scheduling program with resource capabilities. The postprocessor programs generated user-specified displays of output from the PPARS Batch Program. Altogether, PPARS provides a complete, modularized scheduling system. The programs in the PPARS system are written in FORTRAN IV for batch and interactive execution..

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to LAR-12919.

0217 PUMA Computer: A CDC 6600 Emulator

Department of Energy, Washington, DC.

Jun 83 (A)

Using today's technology, a smaller, cheaper, and more reliable computer was developed which emulates a CDC 6600 computer. Although the hardware is architecturally different, it has the ability to run CDC operating systems and execute any job with identical results. This was obtained through the development of unique microcode which is modifiable. One complete system has been constructed for experimental use. It permits the use of current technology computers without having to rewrite programs originally written for the CDC 6600.

FOR ADDITIONAL INFORMATION: Contact: William Marcuse, Office of Research and Technology Applications, Brookhaven National Laboratory, Upton, NY 11973.

Researchers Develop Computer Program To Study Thermal Performance

See 0084

Rotating-Machinery Critical Speeds: Solutions are obtained assuming motion in one plane

See 0625

0218 Screening Tests for MNOS Memory Chips:

Retention and endurance at normal operating voltage can be projected from low-voltage tests

Army Materiel Development and Readiness Command, Alexandria, VA.

Oct 83 (B, K)

A report describes a feasibility investigation of a fast, non-destructive method for screening the retention and endurance characteristics of 8-kb MNOS block-oriented random-access memory (BORAM) devices. The method is based on retention projection. The report was prepared for the U.S. Army Electronics Research and Development Command. Measurements performed on small quantities of MNOS BORAM devices show that the logarithm of retention time varies linearly with the supply voltage present during the write operation. At its current stage of development, the retention project test shows some promise of being useful as the basis for a screen to remove defective or suspect devices from test population.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number AD-A104042, price code: A03.

0219 Software Engineering Data-Base System: System collects and maintains data for software-development efforts

National Aeronautics and Space Administration, Washington, DC.

Apr 83 (A)

The Software Engineering Laboratory Data Base Maintenance System (SEL/DBAM) collects and maintains a data base for evaluating software-development methodologies. SEL/DBAM provides interactive facilities for the management of data collected. It is organized into four component functions: create, archive, restore, and update. SEL/DBAM is written in FORTRAN IV and Assembler for interactive execution. It has been implemented on a DEC PDP-11/70

computer with RSX-11M V3.1 and has a central memory requirement of approximately 64K of 8 bit bytes.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, University of Georgia, Athens, GA 30602; (404) 542-3265.

0220 Special Report Writer: A flexible information-management system for performing multiple correlations on files containing several data hierarchies
National Aeronautics and Space Administration, Washington, DC.

Mar 83 (A)

The Special Report Writer (SRR) accepts input submitted by the user, accesses a sequential data base, and produces a desired special report. The program is a batch-oriented information-retrieval system that performs multiple correlations on files containing several data hierarchies. Report requests are specified in a simple notation, readily learned by people without extensive backgrounds in data processing. It is primarily designed for manipulating a financially-oriented data base. SRR is a COBOL program that utilizes the input-procedure/output-procedure method sorting.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to HQN-10889.

0221 Stability Statistics Data Base System: Four FORTRAN modules implement edit, sort, report-generation, and other function

National Aeronautics and Space Administration, Washington, DC.

Apr 83 (A)

The Stability Statistics Data Base System is written entirely in FORTRAN and does not require the use of outside data-management routines. It is used with a directly-accessible data base containing simple card images. It can be adapted to numerous other data-base applications. With smaller data bases (approximately 15,000 records or less), the fast-response time of the report generator module makes it suitable for running in the demand mode. For larger amounts of data, the module may be run in the batch mode.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, University of Georgia, Athens, GA 30602; (404)542-3265. Refer to MSC-20014.

Standard Transistor Arrays: Random-logic Integrated MOS digital circuits are generated

See 0288

0222 Star-Catalog Data Base: System supports data on approximately 250,000 stars

National Aeronautics and Space Administration, Washington, DC.

Jun 83 (A)

SKYMAP is a collection of computer programs and utility software for creating and maintaining a master star catalog and a hierarchical set of derivative star catalogs. It was developed to provide accurate stellar position and magnitude information for attitude-determination and analysis systems utilizing star sensor observations. The current master star catalog includes all documented stars with blue or visual magnitudes brighter than magnitude 9.0. The principal sources for data on the approximately 250,000 stars in the SKYMAP master catalog are the Henry Draper Spectral

Catalog and the Smithsonian Astrophysical Observatory Positional Catalog. The size of the master catalog precludes its use in most operations, so SKYMAP creates smaller, specialized catalogs including only those stars of interest for a particular application. SKYMAP software is written in FORTRAN IV and Assembler for batch and interactive execution and has been implemented on an IBM 370-series computer.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to GSC-12445/TN.

STATMOOR: Computer Static Analysis of a Single-Point Moored Vessel

See 0872

Steady, Oscillatory, and Unsteady Subsonic and Supersonic Aerodynamics: Modular program is compatible with most geometry preprocessors

See 0025

0223 Stepwise Multiple Linear Regression Program: Calculation and output from a computer program provide more information than required for regression analysis

Department of Energy, Washington, DC.

Oct 83 (A, J)

A program, written in FORTRAN for an IBM 3033 computer, performs multiple linear regression according to a stepwise procedure. The program may be used to transform and combine old variables into new variables and print input and transformed data, sums, raw sums or squares, residual sum or squares, means and standard deviations, correlation coefficients, regression results at each step, an analysis of variance at each step, and predicted response results at each step.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-000824, price code: A04.

Structural Analysis of Shells: Program includes stress, buckling, vibration, and transient analysis of multisegment shells

See 0900

Structural Optimization: An interface between SPAR structural analysis and CONMIN optimization

See 0901

Structural-Vibration-Response Data Analysis: Modal frequencies and dampings are obtained from free-decay records

See 0908

Supersonic-Wing Nonlinear Aerodynamics: Predictions of wing overall force and moment coefficients improved

See 0277

0224 Testing Commercial WAROM's: Word alterable read-only memories (WAROM's) are screened and evaluated for performance according to a test plan

Army Materiel Development and Readiness Command, Alexandria, VA.

Jun 83 (A, B)

A test plan, developed by the U.S. Army Electronics Research and Development Command, details procedures and methods to be used for a 100-percent preconditioning, screening, and lot quality-conformance inspection of com-

mercially-produced MNOS (metal nitride oxide semiconductor) WAROM's for use in military applications. The device type determined to be most suitable for these applications is the military adaptation of a 1,024 by 4-bit WAROM. An accelerated method of testing time-related parameters in MNOS memories has been developed.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number AD-A090774, price code: A04.

0225 Testing of Electronically Alterable Memories:

Accelerated methods are proposed for predicting the end-of-test values of the most important characteristics

Army Materiel Development and Readiness Command, Alexandria, VA.

Apr 83 (B)

Method for the cost-effective screening of nonvolatile, electronically alterable, read-only memories (EAROM'S) was studied. The status of metal/nitride/oxide semiconductor (MNOS) memory technology was reviewed. It discusses the selection criteria used to choose the types of EAROM's for testing and presents a method of accelerated testing of time-related MNOS memories. Nitride thickness is also related in the report to leakage to the substrate. The correlation between leakage values measured during dcparameter testing and soft-erase values was shown.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A091701, price code: A04.

0226 Three-Dimensional Computer Graphics Training Technology

Department of the Air Force, Washington, DC.

Aug 83 (A)

A relatively low-cost 3-dimensional computer graphics display and control capability to simulate aircraft flying in a defined airspace has been developed. The 3-dimensional display capability presents an animated, real-time display of up to three aircraft, plus specialized graphics. In order to transition this new display capability to the training environment, two cassette video-tapes were developed using pre-planned intercept mission scenarios. Both missions address the major intercept geometry issues involved in a different type of intercept tactic and provide a review of these tactics for the student. Potential applications exist for the training of civilian airports. Many of the concepts and techniques utilized could provide valuable guidance to other similar projects.

FOR ADDITIONAL INFORMATION: Contact: Dr. Joe Hazel, Air Force Human Resources Laboratory, Brooks AFB TX 78235; (512) 536-3426.

Tile-Failure Analysis: Probability model assesses failure risk of systems with widely-varying loads and material strength

See 0909

Trajectory-Estimation Error Analysis: Program computes errors caused by assumed values of unadjusted parameters

See 0910

Two-Dimensional Grids About Airfoils and Other Shapes: Program treats arbitrary boundaries through solutions of Poisson's equation

See 0029

Vertical Profiles for Turbojet-Powered Aircraft: Optimum profile minimizes operating cost

See 0030

ELECTROTECHNOLOGY

0227 Acceleration-Compensated Crystal Resonators: Proper choice of crystal orientations minimizes changes in frequency

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 (B, J)

The principles of opposing-pair quartz or other crystal resonators with minimal susceptibility to vibration-induced frequency changes were explored in a study by the U.S. Army Electronics Research and Development Command. Constant-frequency crystal oscillators have long been in demand, the vibration-insensitive units being particularly useful in vehicles or other environments characterized by shock and vibration.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A085643, price code: A04 or contact project officer Arthur Ballato (201) 544-2773.

0228 Antenna Field-Display Technique

Department of Commerce, Washington, DC.

Sep 83 (B)

A study has been completed providing methods of describing the intensity of nonionizing radiation in the near-field of microwave antennas. The methods will be used as support in developing radiation guidelines. A computer program was developed using planar near-field analysis to produce graphical representations of the radiated field intensity as a function of distance from the antenna in the near-field region.

FOR ADDITIONAL INFORMATION: Contact: R.L. Lewis, Division 723.05, National Bureau of Standards, Boulder, CO 80303.

Assembling IC Chips from Tape Reels: Tape-automated bonding reduces costs and increases reliability

See 0510

0229 Automatic In-Process Microcircuit Evaluation: A demonstration model can detect 94.3 percent of faulty thick-film conductor lines on substrates

Army Materiel Development and Readiness Command,
Alexandria, VA.

Jun 83 (B, K)

A method of the automatic in-circuit inspection of hybrid thick-film conductor faults on substrates resulting from printing, probing, and work-in-process handling was developed in an experimental investigation sponsored by the U.S. Army Electronics Research and Development Command. Another goal of the study was the elimination of microscopes for the visual precap inspection of hybrid assemblies. Techniques of hybrid image extraction were examined and illumination requirements were determined, together with return-beam vidicon (RBV) operating modes, for a demonstration model.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A091854, price code: A11 or contact project officer R.J. Wildenberger (201) 544-4258.

Charge-Coupled Device for Recording Transients: Sub-microsecond transients are recorded and read out at slower rates

See 0875

0230 Computer Models for VLSI Fabrication Processes: Far-more-complex device structures can be simulated

Army Materiel Development and Readiness Command,
Alexandria, VA.

Oct 83 (B)

A report describes the development of accurate, physically-correct computer models for fabrication processes for very-large-scale integration (VLSI) circuits. The models are incorporated in a general-purpose, user-oriented computer simulation tool, SUPREM III. This program accepts process schedules as input and provides predicted device structures as output. The report was prepared for the Defense Advanced Research Projects Agency. The program is usable with both bipolar and MOS VLSI structures. It is specifically designed to couple with device simulation programs so that it forms the cornerstone of a hierarchy of VLSI process, device, circuit, and system design aids.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A121414, price code: A19.

0231 Computer-Aided Design of Microwave Antennas: Time and expense can be significantly reduced

Army Materiel Development and Readiness Command,
Alexandria, VA.

Nov 83 (A, B)

A computer program has been developed for the design and simulation of linear-array microstrip antennas for transmitting and receiving signals at microwave frequencies. The work was conducted for the U.S. Army Electronics Research and Development Command. Microstrip-array antennas have the advantages of ease of fabrication, low cost, light weight, and structural conformability. The computer program, which uses a transmission-line network to represent a multi-element linear array, allows the designer to vary any one or more of the antenna-design parameters and to observe such results, as changes in the radiation pattern or amplitude distribution. The program also offers

options for considering the effects of reflections due to impedance mismatch at each element, patch directivities due to the broadside gain of each element, insertion phase, and compensation for insertion phase.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A117399, price code: A02, or contact project officer Morris Campi; (201) 394-3448.

Correcting an Electron Beam in IC Processing: Computer program provides correction for scattering in electron-beam lithography

See 0537

0232 A dc/dc Power Processor: Improved design provides increased reliability and efficiency at reduced production costs

Army Materiel Development and Readiness Command,
Alexandria, VA.

Nov 83 (B)

A 2.4-kW dc/dc converter/regulator produces precise, transient-free, adjustable 24-to 32-V, 75-A output power from a 20- to 4-V unregulated input voltage bus. Design, construction, and testing of the power processor were conducted for the U.S. Army Electronics Research and Development Command. The processor can be used as a standardized power processing module in communications and data handling digital equipment. Tests indicate excellent steady-state performance in output voltage regulation, ripple, and current limiting and good transient response.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A107676, price code: A05.

Depositing Gold on Beryllium/Copper Contacts: Process coats as many as 600 contacts simultaneously

See 0545

0233 Development of High-Contrast CRT: A two-color display will be readable in bright ambient light

Army Materiel Development and Readiness Command,
Alexandria, VA.

Aug 83 (B)

The design and fabrication of a high-contrast, two color-penetration cathode ray tube (CRT) have been explored in a development program sponsored by the U.S. Army Electronics Research and Development Command. The objective of the program is to produce eventually a CRT that is legible in direct sunlight. To obtain the low reflection of ambient light necessary for high contrast, nearly-transparent red and green rare-earth phosphors are deposited on a glass faceplate in thin, nearly transparent layers, with a graded vanadium/vanadium pentoxide light-absorbing backing. Radio-frequency thin-film sputtering is used. In operating tests, a finished tube exhibited a line width less than the proposed maximum of 16 mils.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A084687, price code: A05.

0234 Digital Circuit Analyzer: Logic board tester makes a powerful diagnostic tool in design, production, and maintenance

Department of Energy, Washington, DC.

Apr 83 (B, K)

A portable digital circuit analyzer features 120 independently-programable input/output (I/O) channels for testing large, complex integrated-circuit (IC) boards. With its 15-MHz speed (data change rate) and 1,024-bit storage capacity per channel, the analyzer is in a class by itself as a portable, inexpensive instrument. The instrument also doubles as a basic 120-channel time-domain analyzer, providing triggering on any data pattern with up to 4,095 steps of post-trigger recording within the storage capacity of 1,024 memory locations. Programs may be modified during board testing -- a necessary feature in troubleshooting unfamiliar boards.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DOE/TIC-11398, price code: A05 or contact Paul Priddy, Bonneville Power Administration, Federal Center, 25th & Dover, Moses Lake, WA 98837: (509)762-5316.

0235 Doubly Rotated Quartz for Surface-Acoustic-Wave Devices: Material offers superior temperature stability, but allowance must be made for variations in power-flow angle

Army Materiel Development and Readiness Command, Alexandria, VA.

Oct 83 (J)

A report prepared for the U.S. Army Electronics Research and Development Command, Describes exploratory development of doubly rotated cuts of quartz possessing superior surface-acoustic-wave (SAW) properties. Key properties covered in the program were first-, second-, and third-order temperature coefficients of delay; piezoelectric coupling factor; power-flow angle; bulk-acoustic-wave inverse velocity surfaces; degeneracies; and leaky waves. The sensitivity of these characteristics to misorientation and manufacturing tolerance was evaluated.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A103728/TN, price code: A03 or contact project officer Glen William (210)544-4404.

0236 Doubly-Rotated Cut Quartz for SAW Devices: Improvements in temperature stability are made

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (B, H)

Theoretical and experimental results are available from a two-phase program to develop doubly rotated quartz possessing superior surface-acoustic-wave (SAW) properties. The work was conducted for the U.S. Army Electronics Research and Development Command. Conventional, Singly-rotated cut quartz exhibits a frequency/temperature dependence too high for applications requiring environmentally-hardened SAW filters, oscillators, and resonators. The first phase the program applied theoretical techniques to identify program applied theoretical techniques to identify promising angular orientations for cutting the quartz substrates.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by order-

ing the NTIS report, order number: AD-A110663, price code: A09 or contact project officer A. Ballato (201)544-2773.

0237 Doubly-Rotated Cut SAW Devices: The properties of doubly-rotated cut quartz are characterized

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 (B)

The development of doubly-rotated cut quartz possessing superior surface-acoustic-wave (SAW) properties is underway using analytical and experimental approaches. The program is being conducted for the U.S. Army Electronics Research and Development Command. Currently, the singly-rotated cut quartz used in SAW devices exhibits a frequency/temperature dependence too large for many applications. To identify promising angular ranges for cutting doubly rotated quartz, analytical computer models and numerical computation techniques are used. Methods to X-ray-orient the quartz crystals, to cut the doubly rotated wafers, and to polish the wafers were developed to provide samples for experimental verification..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A086 734/NAA, price code: A06.

0238 Early Warning of Capacitor Failure: An alarm is produced before failure actually happens

Department of Energy, Washington, DC.

Dec 83 (B)

An instrument detects imminent failure in high-dielectric-stress capacitors. It can be used to monitor capacitors on electric power lines and in pulsed-power circuitry, such as that in industrial lasers. By providing a warning of failure, the instrument allows timely replacement of capacitors and prevents costly downtime. The instrument measures the energy flow through the capacitor(s) and measures the width and magnitude of the pulses produced by the unit. The instrument compares the pulses with the pulse width and magnitude of the normal operation. If either the pulse width or magnitude varies from the reference value, the instrument produces an alarm signal.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,330,777, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

0239 Electrical Connector for Graphite Heating Elements: Heat loss and contact resistance are minimized, and thermal stresses are accommodated

National Aeronautics and Space Administration, Washington, DC.

Feb 83 (B, F)

A new connection method solves some difficult problems posed by the interface between an electrical heating element at incandescent temperature and a metal current carrier at essentially room temperature. The connection method applies force to two interfaces: that between the heating element proper and heating-element support members and that between the heating-element support members and the metal conductor. The latter connection is compliant so that the forces do not change appreciably

when the parts undergo thermal expansion or contraction at different rates.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div, P.O. Box 8757, BWI Airport, MD 21240. Refer to NPO-15056/TN.

Electric-Field Probe for High-Voltage Insulators: An acoustic probe and method measure electric fields nondestructively in solid and liquid insulators

See 0444

0240 Electroluminescent Display: Thin-film phosphor provides high luminous efficiency with low power dissipation

Army Materiel Development and Readiness Command, Alexandria, VA.

Aug 83 (B)

Improvements in display technology have been made with the development of the thin-film electroluminescent (TFEL) phosphor devices. A review of the structure, operating characteristics, and potential uses of these devices was prepared for the U.S. Army Electronics Research and Development Command. Conventional display elements using powder phosphors have had short life times and high power consumption for adequate brightness. The TFEL phosphor, on the otherhand, features high contrast legibility in Sunlight, and low power dissipation for up to 30,000 hours of operation. The TFEL displays, characterized by low power consumption, low volume, and light weight, make a wide range of applications possible.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A085641, price code: A02 or contact Project officer Richard P. Tuttle (201) 544-4258.

0241 Electron-Beam Semiconductor Amplifier: These reliable amplifiers have a projected lifetime of 40,000 to 50,000 h

Army Materiel Development and Readiness Command, Alexandria, VA.

May 83 (B)

The electron-beam semiconductor (EBS) amplifiers are hybrid devices that use a high-energy electron beam to control current in semiconductor diodes. EBS's can operate as high-power RF amplifiers, fast-rise-time switches, or current- and voltage-pulse amplifiers. The U.S. Army Electronics Research and Development Command has conducted tests to determine how the reliability and life of EBS's are affected by such diode-degradation factors as the contamination of emitted cathode material, the electromigration of top contact metal, trapped charges, leakage current, junction deterioration, thermal dissipation, and bonding voids. Results show EBS amplifiers as reliable, with a projected life of 40,000 to 50,000 h. The series-connected diode arrangement was used in gridded devices to produce high peak-voltage outputs. This concept could be adapted to the gridded EBS devices to improve their power and frequency capabilities as RF amplifier.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A091283, price

code:AO3, or contact project officer James F. Baxendale, (210) 544-4258.

Electronic Load Tests High-Voltage Solar Arrays: An adjustable load is provided by a combination of transistors and resistors

See 0325

0242 Electrostatic Discharge Phenomenon Research

Department of the Navy, Washington, DC.

Oct 83 (A, B)

The potential for electrostatic discharge (ESD) induced damage to metal oxide semiconductor (MOS) parts is widely recognized; less well recognized is the total spectrum of parts sensitive to damage - surface acoustic wave devices, operational amplifiers junction field effect transistors, microwave and ultrahigh frequency semiconductors and microcircuits, thin film resistors, and precision resistor networks. A database has been established by the Reliability Analysis Center (RAC). This database is a computerized file containing information on the ESD sensitivity information on specific parts.

FOR ADDITIONAL INFORMATION: Inquiries on the VZAP Database should be directed to Mr. Wm. Denson, Reliability Analysis Center, Rome Air Development Center, Griffiss AFB, NY 13441; (315) 33-04151. Other inquiries should contact Technology Transfer Code E411, April 83, Naval Surface Weapons Center Dahlgren, VA 22448.

0243 ESD Protective Material and Equipment: A Critical Review

Department of the Army, Washington, DC.

Jan 83 (A, B)

The purpose of this 135-page report is to increase the awareness and understanding of those factors affecting the choice of optimum, cost effective materials and equipment employed to prevent electrostatic discharge (ESD) damage to sensitive electronic components and equipments. The information compiled within this document provide a valuable resource for those individuals who are responsible for the selection, specification, qualification, and purchase of materials and equipments to be used within their facility to prevent ESD damage to sensitive components. The report goes into considerable depth and detail in discussing and appraising the weaknesses and strengths of available protective devices, materials, and procedures.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A116 954, price \$37.50.

Etching Thin Niobium Films: Photofabrication of superconducting circuits is aided by a new etchant

See 0554

0244 Evaluating PC-Board Materials and Processes: Study evaluates the limits of fine-line resolution on copper-clad PC boards

Army Materiel Development and Readiness Command, Alexandria, VA.

Oct 83 (B)

A document evaluates the limits of resolution between the conductor lines and spaces that are presently attainable on copper-clad PC boards. The evaluation considers combinations of commercially available photoresists and etchants to determine their fine-line production capabilities. The line widths and the extent of undercutting are measured and

compared with those of the original circuit-board artwork. From these data, a minimum line-width limit is determined for each combination of photoresist, photoresist thickness, and etchant.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A103990, price code: A02 or contact project officer Adolph J. Edwards (202) 394-2755.

Fabricating a Microcomputer on a Single Silicon Wafer: Proposed fabrication would reduce microcomputer packaging costs
See 0196

0245 Fabrication of a Precise Microwave Reflector: Machined reflector elements are assembled on graphite/epoxy supports

National Aeronautics and Space Administration, Washington, DC.
Nov 83 (G)

A new antenna reflector integrates several fabrication techniques of optical and composite constraining materials. One of the most critical components in a new radiometer, the reflector must have a precise spherical configuration and must be thermally stable over a very wide temperature range. The reflector is composed of machined aluminum reflector tiles attached to a graphite/epoxy structure with aluminum flexures. To tiles are edge-clamped in aluminum surrounds and fly-cut to the desired spherical configuration.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWE Airport, MD 21240; (301) 621-0100. Refer to: NPO-15377/TN.

0246 Fail-Safe Leads for Superconductors: Catastrophic failure is prevented when coolant flow stops

Department of Energy, Washington, DC.
Sep 83 (D, J)

A new current lead for superconducting electromagnets can operate for a prolonged period after its coolant supply fails. Previously-available current leads overheated and cut off current about 5 minutes after coolant flow ceased; the fast shutdown severely damaged superconducting electromagnets. The new lead, however, can function for 20 minutes after the coolant stops flowing—enough time for a gradual shut-down.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-016115, price code: A02. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. DOE, Washington, DC 20585.

0247 Fiber Optic Cable Repair Kit: Simple procedure permits field repair under adverse conditions

Army Materiel Development and Readiness Command, Alexandria, VA.
Nov 83 (B, D, F)

A portable fiber optics splicing system is being developed for expedient field repairs of communications lines. This work is being conducted for the U.S. Army Communications-Electronics Command. The key component of the splicing kit is the manually-operated splicing machine. Mounted on a single platform this machine has all the tools necessary for making the repair. The machine can prepare the cable for splicing by stripping the outer and inner jackets of the cable, attachment of both a strain/retain ring and

a crimping sleeve on the cable jacket, attachment of the individual fiber-locator sleeves, stripping the fiber jackets, and scribing and cleaving the fiber.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A120380, price code: A03.

Fine-Line Substrates for Microelectronic Hybrids: Size and material costs are cut by half

See 0557

Glass for Solid-State Devices: Glass film has low intrinsic compressive stress for isolating active layers of magnetic-bubble and other solid-state devices

See 0698

0248 Gunn-Diode 60-GHz Oscillator: Local oscillators can be made inexpensively

Army Materiel Development and Readiness Command, Alexandria, VA.
Aug 83 (B)

An experimental oscillator with a negative-resistance GaAs Gunn diode as the active element has performed satisfactorily at frequencies from 47.5 to 59.12 GHz. Built and tested by the U.S. Army Electronics Research and Development Command, the circuit is designed to fill a need for relatively inexpensive oscillators at 60 GHz for such application as local oscillators in receivers and self-oscillating mixers in low-power transmitting/receiving circuits.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A087954, price code: A02.

Hardware Fault Simulator for Microprocessors: A breadboarded circuit is faster and more thorough than a software simulator

See 0200

0249 Hierarchical Graphics Software for IC Design: Modular structure algorithms improve computer processing efficiency

Army Materiel Development and Readiness Command, Alexandria, VA.
Sep 83 (A, B)

A technique to improve design automation processes for IC's involves the use of hierarchically modular processing to partition the design into an easily handled structure. The algorithms performing hierarchically modular processing were developed by the U.S. Army Electronics Research and Development Command. Previous graphic techniques have imposed restrictions on circuit geometries and lead to poor processing efficiency due to the large data storage required. The software incorporating the hierarchically modular processing is designed for use on a dot-matrix printer/plotter and can be used for multilevel simulation, module placement and connector routing, design rule and connectivity checking, and documentation.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A109507, price code: A03 or contact project officer Henry Rielesamen (201) 544-4258.

0250 High-Dynamic-Range EMI Antenna: Tunable antenna picks up background noise and weak interfering signals from 250 kHz to 32 MHz

Department of Commerce, Washington, DC.

Oct 83 (B)

A recently developed antenna for measuring electromagnetic interference (EMI) is an active monopole system that incorporates high-dynamic-range MOSFET's with varactors. Operating with field intensity meter, such as a Singer Stoddard NM-17 EMI/Field Intensity Meter or an equivalent, the antenna will detect 250-kHz to 32-MHz EMI signals in dB micro V in automatically or manually tuned modes of operation. Alternatively the antenna can be connected to a spectrum analyzer operated by remote control via the general-purpose interface bus (GPIB). The antenna can also be operated in a wideband, or untuned, mode.

FOR ADDITIONAL INFORMATION: Contact: John Stanley, National Bureau of Standards, Boulder, CO, (303)497-3995.

High-Speed Data-Sampling System: Charge-coupled device delay lines are used in a 10-MHz sampler with 12-bit accuracy

See 0201

0251 High-Voltage, Low-Inductance Thyratrons:

Feasibility of a 250-kV thyatron switch is established

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (B)

Several experimental multistage thyatron tubes have been designed, built, and tested in a program directed toward the development of a 250-kV thyatron switch that delivers a current pulse of tens of kilo-amperes with a rise time on the order of 10 ns. The program was conducted for the U.S. Army Electronics Research and Development Command. The first of two preliminary tube designed investigated had four box-type grids and five nominal electrode spacings varying from 121 mils to 115 mils. The second design was identical to the first except that it had two additional grids, providing a total of seven gaps. Based on preliminary results, a higher voltage thyatron tube with three stages was designed and tested..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A110132, price code: A02 or contact project officer William Wright (201) 544-5409.

0252 Hybrid Microelectronic IC's as Timing Fuzes: Design employs custom monolithic IC's to reduce production costs

Army Materiel Development and Readiness Command, Alexandria, VA.

Aug 83 (B)

A four-phase development program was initiated for the manufacture of a hybrid micro-electronic special-purpose interface circuit for use in electronic timing fuzes. Results of the program, which ranged from design to pilot-scale production, were provided for the U.S. Army Electronics Research and Development Command. Results of the test program found that the monolithic IC was the most critical component, associated with 51 percent of the reported failures. Pilot production runs were conducted to make cost estimates for high-volume production..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by order-

ing the NTIS report, order number: AD-A082769 price code: A07 or project officer B. T. Joyce (301) 394-3080.

0253 Implementing Exclusive-OR Logic: A basic four-input XOR is assembled from one decoder and one NAND gate

National Aeronautics and Space Administration, Washington, DC.

Jun 83 (B)

A BCD-to-decimal decoder and one four-input NAND gate can be wired as a four-input exclusive-OR (XOR) gate. Combining several of the basic two-IC arrangements allows XOR of any number of inputs.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-18458/TN.

0254 An Improved Acceleration Switch: This acceleration switch resists high vibration and shock and operated at 15 g + or - 3 percent with minimum lag

Department of Energy, Washington, DC.

Aug 83 (B, F)

A mechanism that closes an electrical switch at a predetermined threshold acceleration utilizes variable fluid damping and retractable piston bearings. This improved arrangement withstands high stresses and ensures reliable operation. Conventional acceleration switches have been either too damped with unacceptable lag times or too frail under extreme acceleration conditions. The mechanism consists of a piston suspended by a helical spring in a cylindrical housing. The piston translates on eight rollers positioned around the top and bottom of the piston. Under high lateral forces, the rollers can withdraw into the piston to prevent breakage..

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,266,107, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1. For licensing information, contact Office of Assistant General Counsel for Patents, U.S. DOE, Washington, DC 20585.

0255 Improved High-Voltage Bushing: Electric fields that cause surface breakdown are reduced

Department of Energy, Washington, DC.

Aug 83 (B, F)

A new high-voltage feedthrough bushing features a widened dielectric cover that is less subject to flashover (surface electrical breakdown) than are conventional bushings. The improved model is constructed with materials and configuration similar to those of more conventional types, the improvement being effected by shape changes that alter the electrostatic field. A grounded-metal throat shield moves the region of high electric field away from the grounded base to prevent breakdown in the base region..

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,296,274, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. DOE, Washington, DC 20585.

0256 Improved Pulsed 140-GHz IMPATT Oscillators:

Output power is greater than that from earlier units
 Army Materiel Development and Readiness Command,
 Alexandria, VA.

Sep 83 (B)

Pulsed impact-avalanche-and-travel-time (IMPATT) diode oscillators for 140 GHz have been developed for the U.S. Army Armament Research and Development Command. As a result of advances in diode design and packaging, power output three to four times that previously available has been achieved. Both single-diode oscillators and multiple-diode oscillators with waveguide power combiners were investigated. Double-drift IMPATT diodes were fabricated by a combination of n-type epitaxial growth and p-type implants. The diodes were mounted in copper heat sinks for high-peak-input-power (about 75-W), short-pulse operation. FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A083450, price code: A05 or contact project officer Dick McGee (301) 278-2170.

0257 Improving Power-Supply Regulation for Pulsed Loads: A bypass circuit speeds up regulator response to turn-on transients

National Aeronautics and Space Administration,
 Washington, DC.

Apr 83 (B)

A new power-supply voltage-regulator circuit speeds up the response to sudden load changes. As soon as the load increases, an additional feedback path is enabled. This path bypasses, and provides faster loop response than, the normal feedback path. Steady-state instability due to the faster loop response is avoided by progressively disabling the bypass loop and allowing the normal feedback path to take over.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div., P. O. Box 8757, BWI Airport, MD 21240. Refer to MSC-20016.

0258 Inexpensive Logic-Level Converter: Transformer circuit allows two-way communication between a high-level data bus and low-level TTL integrated circuits

National Aeronautics and Space Administration,
 Washington, DC.

Jan 83 (B)

A relatively-simple transformer circuit boosts 0-to-5-volt pulses from TTL circuitry to plus or minus 10-volt pulses for transmission over a data bus. It also reduces the bus voltages to the lower voltages required by TTL circuitry. The new circuit consists of the transformer (the three windings of which are wound in the turns ratio 3:1:1), two voltage-reference networks, a quad differential line receiver, and a line driver.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer, P.O. Box 8757, BWI Airport, MD 21240. Refer to MSC-18965.

0259 Integrated Submillimeter-Wave Mixer: Planar construction would improve reliability and reduce noise

National Aeronautics and Space Administration,
 Washington, DC.

Apr 83 (B)

A proposed mixer for submillimeter-wave signals would be fabricated as an integrated semiconductor structure. It would be made by molecular-beam epitaxy and would con-

tain an array of planar Schottky-barrier diodes. The proposed mixer consists of a substrate of near-intrinsic gallium antimonide on which are deposited doped indium arsenide regions and a metalization pattern. Parts of the metalization pattern act as a phasearray antenna.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div., P.O. Box 8757, BWI Airport, MD 21240. Refer to NPO-15238.

0260 L-Band Surface-Acoustic-Wave Filters: Devices have been fabricated on lithium niobate and ST-quartz

Army Materiel Development and Readiness Command,
 Alexandria, VA.

Jan 83 (B)

A report of the U.S. Army Electronics Research and Development Command discusses the design of L-band surface-acoustic-wave (SAW) filters. Although the particular filters are intended for the front ends of receivers in the Global Positioning System, the technology has general applicability in the field of L-band signal processing. The report discusses the physical principles affecting the design of SAW filters with group-type unidirectional transducers. Topics include the factors contributing to insertion loss, the theory of unweighted transducers and transducers that have been apodized by electrode weighting, harmonic devices, impedance matching, and phasing. Computer programs for filter design appear in the appendix.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A097977, price code: A04.

0261 A Limiter for High-Power X-Band Receiver: Mass-production process is available for X-band semiconductor limiters

Army Materiel Development and Readiness Command,
 Alexandria, VA.

Nov 83 (B, G)

Production techniques were developed for a low-cost, reliable semiconductor limiter for microwave receivers in X-band frequencies. The work was conducted for the U.S. Army Electronics Research and Development Command. The limiter consists of a high-resistivity silicon limiter followed by a two-stage junction-diode limiter. Designed for the frequency band between 9.0 and 9.65 GHz, it handles 20 kW of peak power at a 0.25 micro s peak width and 4,000-Hz pulse repetition frequency. The production process for the bulk limiters consists of high-volume semiconductor batch processes and fabrication techniques scaled to 100 assemblies per month.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A113 129/NAA, price code: A07.

Manufacturing Thick-Film Crystal Oscillators: Production operations, including inspections, are described in detail
See 0592**0262 Mathematical Models of VLSIC's: Models of fabrication processes, devices, and circuits are being developed**

Army Materiel Development and Readiness Command,
 Alexandria, VA.

May 83 (B, J)

The economical procurement of small quantities of high-performance custom-designed IC's is often impeded by inadequate mathematical models, which handicaps low-cost computer-aided design. Now, however, a program conducted for the Defense Advanced Research Projects Agency has formulated models of fabrication processes, devices, and circuits specifically for very large-scale integration (VLSI). The basic areas investigated under the program are thermal oxidation, ion implantation and diffusion, the chemical-vapor deposition of silicon and refractory-metal silicides, and device simulation and analytic measurements.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-AO91969, price code: A17.

0263 Measuring Voltage on Magnetically Insulated Lines: Parabola traced by an ion beam gives a measurement

Department of Energy, Washington, DC.

Dec 83 (J, K)

Direct measurement of magnetically-insulated transmission-line voltages can now be made with the aid of a charged-particle analyzer. Previously, it was necessary to rely on inferred voltages based on theoretical calculations and current measurements. Magnetically-insulated transmission lines are an essential component of light-ion-beam fusion devices because they permit many radial pulsed-power lines to converge to give extremely high power densities. Voltage measurements on such lines are critical to establishing energy transport and power available for fusion. The new direct voltage measurement exploits the fact that negative ions are produced at the cathode of a transmission line and are accelerated through the line potential to the anode. Measuring the peak energy of the ions exiting through a hole in the anode gives the peak line voltage.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: SAND-80/2685C, price code: A02. For information not in the report contact: Regan W. Stinnett, Sandia National Laboratories, Division 1261, Albuquerque, NM 87107; (505)844-0043.

0264 Microprogrammed Sequencer for Tunable RF Oscillator: Standard IC chips and digitally tuned oscillator are combined

National Aeronautics and Space Administration, Washington, DC.

Sep 83 (B)

A circuit originally designed to 'dither' the transmitter frequency of a K-band radar at high rates may find application in such other areas as automated test equipment or computer-controlled receiver tuning. The circuit consists of PROM-based microprogrammed control sequencer, which drives a group of diode switches to select one of eight tuning capacitors in an L-C oscillator. A synchronizing pulse is used to clock the various mode-control inputs and a 'next address' into a 74LS377 latch.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to LAR-12903.

0265 Milliwatt dc/dc Inverter: Compact unit shifts dc voltage level and isolates it from the input

National Aeronautics and Space Administration, Washington, DC.

Oct 83 (B)

Only one integrated circuit and just a few external components are needed to make a dc-to-dc inverter with isolated input and output voltages. The required IC is a hex inverter, such as the 7404, and the outboard components are a small transformer, two diodes, and a few resistors and capacitors. The inverter gates function as the switching oscillator and the driver amplifier for the circuit. If the IC is a transistor-transistor-logic (TTL) module, the inverter delivers 100 to 150 milliwatts; if only microwatt power is required, a CMOS (complementary metal-oxide semiconductor) IC may be used.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to NPO-15157/TN.

0266 Miniature High-Contrast Color CRT Module: New penetration-screen tubes make possible a new kind of color display

Army Materiel Development and Readiness Command, Alexandria, VA.

Jan 83 (B)

A practicable high-contrast color cathode-ray-tube (CRT) display module has been proposed for an airborne radar system. The module is to display alphanumeric or graphical data in multicolor. To meet such objectives, a color circuit is needed that will meet exacting standards of color registration and intercolor brightness uniformity. The module must also satisfy the severe size, weight, and power-consumption requirements. A functional block diagram of the module, proposed to the U.S. Army Electronics Research and Development Command, was designed. Breadboard versions have performed well. The technical concepts being implemented should form the basis for a new class of compact multicolor CRT display systems.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A097727, price code: A03.

Minimizing Corrosion of Kovar Leads: Study outlines the steps that would make these leads less susceptible

See 0729

0267 Nanosecond-Pulser Project: Specially designed components are under development

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (B, J)

The design and testing of components for a nanosecond pulse circuit is the subject of a report prepared for the U.S. Army Electronics Research and Development Command. When fully developed, the pulser will be a small unit that could energize a stroboscope, flashlamp, or laser at a pulse-repetition rate up to 20 kHz. An improved version of the thyatron was demonstrated. It features a reduced triggering requirement and increased voltage standoff that permits operation at higher pressures with consequent reduction of voltage-drop time.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A121575, price code: A03.

0268 A New Material for Acoustic Wave Devices:

Berlinite is a highly piezoelectric material with a coupling factor exceeding that of quartz

Army Materiel Development and Readiness Command, Alexandria, VA.

Oct 83 (B, J)

A report discusses a study of alpha aluminum phosphate (berlinite) as a piezoelectric material for advanced bulk- and surface acoustic-wave devices. The study, conducted for the U.S. Army Electronics Research and Development Command, covered crystal structure, methods of crystal growth, defects in structure, the presence of water impurities, piezoelectric resonators, and equivalent electric circuits. Calculations were made of frequency constant, piezoelectric coupling factor, and linear temperature coefficient as functions of orientation of the crystal.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A104685, price code: A03 or contact project officer Arthur Ballato (201) 544-2773.

0269 New Transducer Calibration System Is Key To Automated Tool-Set Device

Department of Commerce, Washington, DC.

Mar 83 (A, B, G)

Researchers at the National Bureau of Standards (NBS) have developed an inexpensive, microprocessor-based calibration system that greatly improves the accuracy of a wide variety of commonly-used industrial transducers. NBS engineers have already applied the technique to the design of a new automated tool-setting station--using commercial, position-sensitive transducers--that is capable of setting a tool for a machining center substantially faster and at higher accuracies than manual tool-setting. The new procedure improves the linearity of transducers--the degree to which a constant change in the condition measured by the transducer produces a constant change in the output of the transducer. In principle, it can be applied to any of a broad range of transducers that have reproducible responses: thermocouples, strain gages, and hot-wire and film anemometers, for example. An important feature of the system is simplicity.

FOR ADDITIONAL INFORMATION: Contact: Dr. Donald Blomquist, National Bureau of Standards, Washington, DC 20234; (301) 921-3381.

0270 Permanently Sticky Lining for Transmission Lines: Lining Is nonsticky before installation and sticky afterward

Department of Energy, Washington, DC.

Dec 83 (C)

An improved adhesive lining traps contaminating particles in high-voltage components such as coaxial transmission lines. From time to time such particles enter the space between the inner and outer conductors where they may cause sparking, corona, or a breakdown of the insulating gas or insulating supports. Unlike earlier nonpermanently sticky linings, the new lining does not have to be periodically treated to restore its stickiness and does not require lining-softening solvents that decrease the dielectric strength of the insulating gas.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. patent 4,343,964, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1. For licensing informa-

tion, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

0271 Photoactive RF Generator: RF emissions in the 30- to 300-centimeter wavelength range are produced from light pulses at an efficiency above 90 percent

Department of Energy, Washington, DC.

Sep 83 (B)

A relatively-compact RF generator employs a photoemissive device to produce RF emissions with the same frequency as the activating light pulses. Conventional RF power generators, such as klystrons, gyrocons, and gridded electron tubes, have either limited frequency ranges or relatively-low conversion efficiencies (less than 80 percent at best) or both. The generator consists of a light source coupled to a vacuum chamber that houses a photoemissive device and an RF resonator. The light source is a laser, which utilizes a modelocking device and mirror spacing to set the pulse characteristics, and a frequency shifter to increase the photon energy of the emitted light. The limits of the output frequency are determined by the mirror spacing of the laser and the physical size of the resonator. For this system, the practical limits are between 100 and 1,000 MHz.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,313,072, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. DOE, Washington, DC 20585.

0272 Polyphase Rotary Induction Machine: This machine functions as motor or generator without modification

Department of Energy, Washington, DC.

Jun 83 (B)

A polyphase rotary induction machine serves as ac motor or generator without modification. As a generator the machine can supply ac power throughout its full range of speed without overheating the rotor winding, something the conventional induction machines cannot do without elaborate speed-control schemes. As an additional feature the machine can operate at low speeds without introducing the impedance externally into its circuits. One of the promising applications for this induction machine is in the operation of wind turbines that are used to generate electric power. Since these turbines are not self-starting, the machine would serve as a motor to drive the turbine to an operating speed.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,228,391, which is available from: Commissioner of Patents Washington, DC 20231 for \$1.00. For licensing information, contact: Office of Assistant General counsel for Patents U.S. Department of Energy Washington, DC 20585.

Portable I/V-Curve Tester: Battery-operated electronic load displays current/voltage characteristic on a portable oscilloscope

See 0365

0273 Power-Factor Controller Avoids False Turnoff: A phase-difference signal is utilized to ensure triggering each half cycle

National Aeronautics and Space Administration, Washington, DC.

Jun 83 (B)

An improved triggering circuit for power-factor motor controllers insures effective triggering at all current/voltage phase angles. The new circuit triggers the thyristor in the normal manner unless current from the preceding half cycle is flowing, but a signal already present in the power-factor controller is used to inhibit the transmission of the firing pulse to the thyristor gate until the current returns to zero. A new inhibiting circuit establishes a reference time (namely, the moment the current goes to zero) for firing the thyristor based on the phase-difference signal and prevents generation of the firing pulse in advance of this reference time.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25616/TN.

0274 Production of Microwave Acoustic Delay Lines: Improved design provides wider tolerances for production process parameters

Army Materiel Development and Readiness Command, Alexandria, VA.

Dec 83 (B, G)

A program to develop low-cost production techniques for reliable, rugged bulk acoustic wave delay line has resulted in an improved design for the delay lines which uses mosaic transducers and monolithic impedance matching. The program was conducted for the U.S. Army Electronics Research and Development Command. The design improves the performance at reduced costs and allows greater flexibility in the manufacturing process. Mosaic transducers are formed by dividing the active area into sections, which can be connected in series or in parallel, resulting in a significant reduction in the interaction between input impedance and insertion loss. The feasibility of the design was demonstrated using a computer-linked photolithographic process to produce engineering samples.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A197339, price code: A07.

0275 Programmable Pulse Generator: Pulse lengths and sequence from many outputs are readily altered

National Aeronautics and Space Administration, Washington, DC.

Jan 83 (B)

A new pulse generator can be programmed to produce pulses from several ports at different pulse lengths and intervals and in virtually any combination and sequence. The generator operates at intervals between pulses as short as 0.5 micro second. The unit contains a 256-word-by-16-bit memory that is loaded with instructions either manually or by a computer.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer, P.O. Box 8757, BWI Airport, MD 21240. Refer to NPO-15168.

0276 Pulsed Phase Shifter Improves Doppler Radar: Periodic phase inversion puts Doppler signal on a carrier for easy amplification and processing

National Aeronautics and Space Administration, Washington, DC.

May 83 (B)

The ability of a microwave Doppler radar to measure the velocity of a slow-moving nearby target (such as an automobile) is enhanced by a pulsed 90 deg phase shifter in

the radar transmission line between the circulator and the antenna. Because of the phase shifting, the Doppler frequency is detected as modulation on a carrier instead of as a baseband signal. The carrier can be amplified and filtered before demodulation, resulting in a strong, clean demodulated Doppler for measurement and display.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-18675/TN.

0277 Radiation Damage in Thermal SiO₂ MOS Devices: Results from electrical and chemical analyses are presented

Army Materiel Development and Readiness Command, Alexandria, VA.

Dec 83 (B, J)

A study investigated the effects of ultraviolet and electron irradiation on thermal SiO₂ MOS devices. The work, which was conducted for the U.S. Army Electronics Research and Development Command, is intended to improve an understanding of radiation-damage mechanisms on wet- and dry-grown SiO₂ MOS oxides. The study was focused on MOS capacitors prepared by growing wet and dry oxides on silicon to produce both hardened and soft MOS substrates. The capacitors were fabricated with semitransparent and thick aluminum gates and irradiated with 10.2-eV vacuum ultraviolet photons and 1-MeV electrons, respectively.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A111149, price code: A05.

0278 Repairing Loose Connector Pins: Pins can be glued in place if a spring finger fails

National Aeronautics and Space Administration, Washington, DC.

Dec 83 (B)

The electrical serviceability of a damaged connector can sometimes be restored by bonding loose contacts to the connector insert with an adhesive. The procedure eliminates the time-consuming operations of completely removing and replacing the faulty electrical connector and then testing the affected wiring. In the repair procedure, a hypodermic needle is used to apply an epoxy adhesive in and behind the cavity containing the damaged locking finger. The damaged connector does not have to be demated or removed from the harness to apply the epoxy.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB83-925212, price code E02.

0279 Repairing Microelectronic Hybrids: Delidding and resealing techniques afford minimum expense and circuit degradation

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (B)

An economical method for repairing microelectronic circuits involves the precision removal and replacement of the covers on the hermetically-sealed hybrid packages. Development of the process was conducted for the U.S. Army Missile Command. Previously, circuit repair involved costly package replacement, requiring extra handling steps and several thermal excursions that degraded the reliability of

the hybrid. The delidding technique selected, based on an industry survey, was precision sawing over end milling.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A115776, price code: A05 or contact project officer Paul Wanko (205) 876-3498.

0280 Researcher Develop Camel Diode Gate Field Effect Transistors

Department of the Air Force, Washington, DC.

Dec 83 (B)

The camel gate FET(CAMFET) uses a camel diode instead of a Schottky diode (as in a MESFET) or a p-n junction diode (as in a JFET) for modulating the current in the FET channel. The camel gate is formed by very thin n+ and p+ layers (typically 200 Å and 100 Å thick respectively) together with the channel layer. This structure gives an energy band diagram with an asymmetrical barrier to current transport. Use of a camel gate provides several advantages. First, varying the thickness and dopings of the various layers allows easy variation of the barrier height, with barrier heights up to the bandgap of the semiconductor being possible. Because of their many advantages, camel gate FETs appear well suited to both discrete and LSI applications..

FOR ADDITIONAL INFORMATION: Contact: Hadis Morcock, University of Illinois, Coordinated Science Laboratory, 1101 West Springfield Ave., Urbana, IL 61801.

Resolution Limits in Electron-Beam Lithography: The target material, rather than the electron source, limits the resolution

See 0623

0281 RF Sputtering of Gold Contacts on Niobium: Low-resistance contacts are stable down to 4.2 K

National Aeronautics and Space Administration, Washington, DC.

Jul 83 (B, G, H)

Reliable gold contacts are deposited on niobium by a combination of RF sputtering and photolithography. The process results in structures that have gold only where desired for electrical contact. The contacts are stable under repeated cycling from room temperature to 4.2 K.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15624.

Screening Tests for MNOS Memory Chips: Retention and endurance at normal operating voltage can be projected from low-voltage tests

See 0218

0282 Self-Monitoring High-Voltage-Line Insulators: A dye or pressure gage on the insulator reveals small damages prominently

Department of Energy, Washington, DC.

May 83 (B, C, K)

A self-monitoring insulator for suspending high-voltage transmission lines from support structures has a built-in dye or pressure gage. Inspectors checking the transmission lines can readily spot damages to such insulators from a distance. A dye on the surface or a drop in the pressure gage reveals such damage as bullet holes from vandalism or failure of the shed body due to excessive electrical arcing or corona-induced erosion of the shed material.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,291,193, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1.00. For licensing information, contact: Office of Assistant General counsel for Patents, U.S. DOE, Washington, DC 20585.

0283 Self-Oscillating 60-GHz Diode Mixers: Gunn-diode units are inexpensive

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 (B)

Gunn-diode microwave mixers have been successfully demonstrated in experiments by the U.S. Army Electronics Research and Development Command. Operating at an input RF in the 60-GHz range, the negative-resistance diode serves as both the local oscillator and mixing diode. Unlike conventional mixers using only passive devices, self-oscillating mixers are capable of conversion gain. This feature gives them a sensitivity previously attainable only with more complex and expensive systems. Self-oscillating mixers using GaAs or InP Gunn diodes were constructed in two versions: a metal coaxial/waveguide hybridcavity oscillator and a dielectric image-waveguide oscillator..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A085 026/NAA, price code: A02 or contact project officer Samuel Dixon (201) 535-4926.

0284 Simple Temperature Regulator for a Cold Chamber: Circuit generates an overtemperature warning independent of the regulation function

National Aeronautics and Space Administration, Washington, DC.

Mar 83 (B)

An electronic control circuit holds a cold chamber at a selectable temperature and lights a warning light if the temperature exceeds a predetermined level above the control temperature. The circuit uses only two standard operational amplifiers.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-18927.

0285 Soft-Starting Power-Factor Motor Controller: Starting current surges and motor vibrations are suppressed

National Aeronautics and Space Administration, Washington, DC.

Jun 83 (B)

An improved three-phase power-factor controller reduces the large current surge that usually accompanies starting. Unlike circuits that apply power in discrete increments, the improved controller applies power smoothly, without causing motor vibrations. In the improved version, the constant command voltage is disconnected during a startup interval of 5 to 30 seconds. During that interval, the constant command voltage is replaced by a ramp signal that is summed with the operating power-factor signal from the phase detectors to produce a starting control signal. The modification extends the capability of the controller to reduce power consumption during starting as well as during full-speed operation and to provide a single control circuit for all stages of operation.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to MFS-25586/TN

0286 Soldering Gold Plated Wires Into Plate-Through Holes: Double-tinned leads and clenched termination give better joints

Army Materiel Development and Readiness Command, Alexandria, VA.

Jul 83 (B)

Methods of terminating gold-plated wires on printed-circuit boards with plated-through holes were compared in a series of experiments. The investigation was conducted by the U.S. Army Missile Command in order to settle some uncertainties about the relative advantages of various wire-termination techniques. The experimental data confirm the general belief that contamination by gold tends to weaken solder joints.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A087352, price code: A02 or contact project officer Roger L. Yocom (205) 876-3498.

0287 Solid-State Circuits for Cryogenic Operation: Selected commercially available components perform satisfactorily at 1.25 K

National Aeronautics and Space Administration, Washington, DC.

Nov 83 (B)

Tests at NASA's Jet Propulsion Laboratory confirm the operation of five commercial semiconductor devices --one tunnel diode, one field-effect transistor, and three CMOS integrated circuits--all perform well in circuits immersed in a liquid-helium bath. For some of the tests, the bath temperature was reduced to 1.25 K by pumping.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWE Airport, MD 21240; (301) 621-0100. Refer to: NPO-15255/TN.

Stable Polyurethane Coatings for Electric Circuits: Alkane-based polyurethanes resist deterioration while maintaining good dielectric properties

See 0755

0288 Standard Transistor Arrays: Random-logic integrated MOS digital circuits are generated

National Aeronautics and Space Administration, Washington, DC.

Oct 83 (A, B)

Connections between the transistors in a gate, and connections between gates, occur with such frequency that good physical solutions may be extremely complex. Achieving a good physical solution is especially important in the design of digital large-scale-integration (LSI) circuitry. The Standard Transistor Array (STAR) design system is a semicustom approach to generating random-logic integrated MOS digital circuits. The primary program in the STAR system is CAP-STAR, the STAR Cell Arrangement Program. CAPSTAR is augmented by an automatic routing program, a display program, and a library of logic cells. Input to CAPSTAR consists of a description of circuit cells and interconnections. The programs in STAR are written in BASIC and FORTRAN IV for batch execution and have been implemented on a Xerox Sigma V.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112. Barrow Hall, Athens, GA 30602.

0289 Status of Hybrid Microcircuit Manufacture: Report summarizes materials and assembly techniques used for making microcircuits and includes thick-film and thin-film technologies

Army Materiel Development and Readiness Command, Alexandria, VA.

Jan 83 (B, G)

The present status of hybrid microcircuit manufacturing is described in a report prepared by the U.S. Army Electronics Research and Development Command. The microcircuits combine active and passive components for analog, digital, and microwave applications. All aspects of their manufacture are covered, which include design considerations, the selection of materials, fabrication and assembly techniques, packaging, and testing procedures.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A097000, price code: A02 or contact project officer Isaac H. Pratt (201) 544-2308.

0290 Storage Life of Plastic-Encapsulated Microcircuits: Plastic packaging does not affect reliability after accelerated storage tests

Army Materiel Development and Readiness Command, Alexandria, VA.

Jun 83 (B)

Plastic-encapsulated microcircuits have been evaluated for storage reliability in a study conducted for the U.S. Army Electronics Research and Development Command. Three types of devices were used in the study: two hybrid microcircuits and one monolithic IC. The object was to determine the effect of long-term storage on reliability. Screening tests and accelerated environmental tests were used. The results of the study do not indicate a reliability problems related to plastic encapsulation.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A089632, price code: A02 or contact project officer Edward B. Hakim (201) 544-4258.

0291 Stripping Conductor Insulation by Laser: Method is safe and effective for coaxial cable as well as single-conductor wire

Department of Energy, Washington, DC.

Dec 83 (B, G)

A device for stripping insulation from wire and coaxial cable uses a 50-W carbon dioxide laser. The device is especially suited to stripping Kapton, or equivalent, insulation. This material, used increasingly in electronic equipment, is difficult to remove. Thermal stripping cannot be used because it chars the Kapton. Mechanical stripping with guillotine-like blades tends to nick the wire. In contrast, the laser-stripping method cuts through the insulation cleanly, leaving a powdery residue that can be brushed away.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-020367, price code: A02.

0292 Submicrosecond Laser Pulser: Circuit will deliver 5 kA at 24 kV

Army Materiel Development and Readiness Command,
Alexandria, VA.

Jul 83 (B, J)

Evolving versions of a Blumlein laser-pulse circuit are described in a report of the U.S. Army Electronics Research and Development Command. When fully developed, the circuit will deliver pulses of 5 kA, 24 kV peak, 30 ns rise time, and 100 ns duration, either in one shot or at repetition rates up to 20 Hz.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A087291, price code: A02.

Superconducting Wires With Improved Strain Characteristics: Current capacity is less affected by applied tensile stress

See 0903

0293 Surface-Acoustic-Wave Frequency Synthesizer: Synthesizer will operate in the 1,533-MHz frequency range with 3-MHz step size

Army Materiel Development and Readiness Command,
Alexandria, VA.

Aug 83 (B)

The second of a two-part program is under way for the development of surface-acoustic-wave (SAW) technology for the U.S. Army Electronics Research and Development Command. SAW oscillators were developed to be incorporated in a microwave frequency synthesizer for the second part of the program. The use of SAW devices improves switching speed, step size, total achievable bandwidth, and the stability of synthesizers at reduced size, weight, and power consumption (5W).

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number AD-A086336, price code: A03 or contact Project Officer Thomas Aucoin (201) 544-2452.

0294 Survey of Fast Analog-to-Digital Converters: Sampling rates above 100 kHz are sought

Army Materiel Development and Readiness Command,
Alexandria, VA.

Aug 83 (A, B)

A survey of sample-and-hold devices (SHD's) and analog-to-digital converters (ADC's) is presented in a report of the U.S. Army Missile Command. Devices capable of sampling rates in excess of 100 kHz were identified and their characteristics compared as part of an effort to fill the anticipated needs of military systems. Potential civilian applications might include the digitization of television, voice, and instrumentation signals. The input and output waveforms of SHD's are discussed so as to define their performance parameters. Commercially-available ADC's are compared by resolution, sampling rate, packaging, cost, size, power, accuracy, and temperature stability.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A082435 price code: A05.

0295 Tangleproof Rotary Electrical Coupling: Electrical cables are carefully dressed to permit 320 rotation

National Aeronautics and Space Administration,
Washington, DC.

Sep 83 (B)

A new rotary coupling connects a large number of electrical cables to a turntable without stressing the cables or tangling them. The device accommodates 246 cables containing a total of 758 conductors and allows the turntable to rotate through an arc of 320. The rotary connector was developed to carry electrical signals to and from a telescope platform on a satellite without a complex and electrically noisy set of slip rings. The principle is also suitable to rotary actuators.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB83-925209, price code E02.

0296 Target Materials for IR Image Tubes: Improved materials are described for use in IR imaging and thermal-to-electric energy conversion

Army Materiel Development and Readiness Command,
Alexandria, VA.

Aug 83 (B, H)

A class of new materials, called improper ferroelectrics, promises superior performance over the proper ferroelectrics in IR imaging and thermal-to-electric conversion. Improper ferroelectrics (e.g., rare-earth molybdates) show improved performance as vidicon targets as their Curie temperature is approached; proper ferroelectrics show just the opposite, as described in a report for the U.S. Army Electronics Research and Development Command. Improper ferroelectrics may also be used in the manufacture of an energy converter that would not, in general, be feasible using proper ferroelectrics. The converter transforms thermal energy directly to electrical energy.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A082435, price code: A05 or contact project officer G. J. Iafrate (201) 544-4070.

0297 Terminal Strip Facilitates Printed-Circuit Board Changes: Strip can be bonded to board directly over used or unused conductor patterns

National Aeronautics and Space Administration,
Washington, DC.

Nov 83 (B)

A laminated copper and polyimide terminal strip makes it easy to modify a printed-circuit (PC) board, after the board has been fabricated. When epoxied over conductors or an insulating portion of the PC board, the strip provides a series of solder-coated copper conductor pads to which integrated-circuit leads can be soldered for functional changes. The terminal strips can accommodate the leads on a dual, inline IC package or as staggered single or multiple leads on planar mounted flat-packs. With the new terminal strip, changes can be made at any stage of circuit-board population, up until the installation of the board in the final product. Besides serving as a soldering pad for integrated-circuit leads, the terminal strip can perform the same function for the circuit-board connector inputs and outputs when their links with board components must be changed.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: GSC-12748/TN.

Testing Commercial WAROM's: Word alterable read-only memories (WAROM's) are screened and evaluated for performance according to a test plan

See 0224

Testing of Electronically Alterable Memories: Accelerated methods are proposed for predicting the end-of-test values of the most important characteristics

See 0225

0298 Tests of Conformally-Coated Circuit Boards: Coatings prevent the formation of leakage paths

Department of Energy, Washington, DC.

Nov 83 (B, H)

Two conformal coatings have been shown to prevent the formation of leakage paths on printed-circuit boards under typical operating conditions. Tests were performed on simple transistor circuits fabricated on glass/epoxy and glass/triazine substrates coated with Conothane or Parylene, or their equivalents.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-012873, price code: A02. For information not in the report, contact William R. Even, Sandia National Laboratories, Division 8315, Livermore, CA 94550; (415) 422-3217.

0299 Tests on Double-Layer Metalization: Sputtered aluminum patterns on two levels are separated by an insulating oxide

National Aeronautics and Space Administration, Washington, DC.

Jul 83 (B, G)

A report describes experiments in the fabrication of integrated circuits with double-layer metalization. The double-layer metalization requires much less silicon 'real estate' and allows more flexibility in the placement of circuit elements than does single-layer metalization.

FOR ADDITIONAL INFORMATION: To obtain a copy of the report contact Technology Transfer Division, P.O. Box 8757, BWI Airport, MD 21240. Refer to: MFS-25688.

0300 Thin-Film-Transistor Addressed Display: Feasibility study looks for best ways to manufacture these displays

Army Materiel Development and Readiness Command, Alexandria, VA.

Mar 83 (B, G)

A program, sponsored by the U.S. Army Electronics Research and Development Command, investigated processing steps to establish manufacturing technology for small lightweight low-power 256-character alpha-numeric flat-panel displays. Five manufacturing activities proposed for such display consist of: (1) thin-film circuit production, (2) automatic circuit testing, (3) powder-phosphor application, (4) encapsulation, and (5) final test.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A096635, price: \$46.

0301 Three-Color LED Display Panel: Automatic-manufacturing process will produce 750 panels per month

Army Materiel Development and Readiness Command, Alexandria, VA.

Dec 83 (B)

A program to design and manufacture a LED display panel with red, green, and yellow color capabilities is being conducted for the U.S. Army Electronics Research and Development Command. Placed behind maps or other graphic material, the display panel will provide color illumination and highlighting with high resolution. Concomitant to the development of processes and the tooling required to produce the displays at a reasonable cost, a panel exerciser test system was designed and fabricated.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A111959, price code: A07 or contact project officer G. W. Lewis (201) 544-4258.

0302 TRISCAN Antenna-Positioning Algorithm: A method developed expressly for digital positioning improves accuracy and sensitivity

National Aeronautics and Space Administration, Washington, DC.

Sep 83 (B, J)

TRISCAN is a scanning algorithm that improves the alignment between the boresight of a radar antenna and a target. The algorithm was originally developed for digitally pointed antennas in the deep-space network; however, it could possibly be used in locating radio sources on Earth. TRISCAN (the acronym stands for triangular scan) estimates the coordinate errors in hour angle and declination between the predicted and the true locations of a radio source.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-155577.

Ultra-Low-Loss Optical-Fiber Cable: Data-transmission cable will withstand severe environments

See 0182

0303 University VLSI Facility: Custom IC's are rapidly made for evaluation

Army Materiel Development and Readiness Command, Alexandria, VA.

Oct 83 (B)

The activities of a facility for research and development in very-large-scale-integration (VLSI) circuits are described in a report of the U.S. Army Electronics Research and Development Command. The facility is staffed and equipped to design, fabricate, and test IC's, with as short a time as possible for the circuit conception to the completion of a wafer. The facility is part of a project to identify and overcome problems in the design of VLSI circuits with 10,000 to 1,000,000 transistors on a chip. The report discusses the recent progress at the facility in fast-turnaround wafer fabrication, electron-beam lithography, electrical wafer testing, and VLSI device research.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A104001, price code: A03.

0304 Using SAW Resonators in RF Oscillators: Two circuits illustrate the potential of surface-acoustic-wave resonators

National Aeronautics and Space Administration,
Washington, DC.

Oct 83 (B)

Surface-acoustic-wave (SAW) resonators are used as the frequency-determining elements in radio-frequency oscillator circuits at NASA's Ames Research Center. The oscillators can be frequency-modulated, phase-modulated, or pulse-modulated. The SAW resonators are especially applicable to low-power subminiature applications, such as bio-telemetry and wind-tunnel instrumentation, where they can advantageously replace crystals. The resonators are smaller than crystals gives promise of totally-integrated telemetry systems in the future.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: ARC-11390/TN.

0305 Vacuum Processing System for Quartz Resonators: Crystals and holder parts are assembled into finished units

Army Materiel Development and Readiness Command,
Alexandria, VA.

Aug 83 (B, G)

A five-chamber vacuum processing system performs the final steps in the fabrication of quartz resonator units. The system was developed for the U.S. Army Electronics Research and Development Command as a pilot line to produce crystals of high precision. Unplated crystals are inserted in their ceramic-flatpack-holder frames and are placed with the holder lids on transport trays in a lid/frame/lid sequence. The parts are inserted into the system with up to 25 units on a tray and emerge from the system as complete crystal-resonator packages. The major limiting factor at present is the coarse-plating speed..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A084788, price code: A04 or contact project officer J. B. Vig (201) 544-4275.

0306 Variable-Speed Control System for Wound-Rotor Motors: Load-switching circuit designed for multiple-tap transformers operates with stepless speed control

Department of Energy, Washington, DC.

Aug 83 (B)

A circuit designed for variable-speed control systems switches transformer taps without disconnecting power to the motor. Controllers, which require the removal of power during tap switching, are impractical in many applications, since the inertia of the motor is insufficient to hold the load. The load-switching circuit consists of high-voltage and low-voltage rectifier bridges. Depending on motor speed, one of the two bridges is connected to the rotor windings via auto-transformers and slip rings. This bridge can be applied to transformers having any number of taps..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-013589, price code: A02. For licensing information, contact Office of Assistant General Counsel for Patents, U.S. DOE, Washington, DC 20585.

0307 VLSI Reed-Solomon Encoder: Very-large-scale Integrated chips are cascaded to yield the desired level of reliability

National Aeronautics and Space Administration,
Washington, DC.

Sep 83 (B)

A modular Reed-Solomon encoder uses identical custom VLSI chips called symbol slices. By cascading and properly interconnecting a group of these chips, an encoder can be made for any desired error-correcting capability and interleaving level. Two versions of the symbol-slice chips have been designed: One uses shift registers as the internal serial memory while the other uses a random-access memory. The multiplier configuration is the same in both.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to NPO-15470.

0308 Voltage Regulator for dc-to-dc Converter: An extra transformer winding eliminates the need for isolation components

National Aeronautics and Space Administration,
Washington, DC.

Sep 83 (B)

A voltage regulator for a dc-to-dc converter momentarily short-circuits the secondary winding on its drive transformer. The short circuit temporarily turns off the drive to the output transistors. In effect, the short circuit changes the width of the drive pulses, thereby regulating the output voltage. The new voltage regulator isolates signals from the power-switching converter without the use of complex circuitry or optical couplers. The only addition is an extra secondary winding on the existing interstage transformer. Error signals short-circuit the new winding and inhibit converter action. A resistor in series with the primary winding limits the short-circuit current to prevent damage to circuit components.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15208.

0309 500-Watt, 10-GHz Solid-State Amplifier: X-band system amplifies low-duty-cycle pulses

National Aeronautics and Space Administration,
Washington, DC.

Jun 83 (B)

A new, all-solid-state amplifier chain delivers a pulsed 10-GHz signal with peak power of 500 watts. The chain consists of two sections: A six-stage driver amplifier using gallium arsenide field-effect transistors (FET's) to boost milliwatt input pulses to 2 watts, and a four-stage power amplifier using impact-avalanche-and-transit-time (IMPATT) diodes to raise the 2-watt pulses to 500 watts. The new solid-state X-band amplifier package constitutes a reliable, light-weight, compact, RF source. It can be used for many applications involving low- and variable-duty-cycle operation.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301)621-0100. Refer to NPO-152022/TN.

ENERGY

0310 Absorption Heat Pump System

Department of Energy, Washington, DC.

May 83 (C, D)

This system is an improvement that can be applied to absorption heat pumps of the type commonly referred to as 'temperature boosters.' The objective of the improvement is to increase the obtainable temperature boost and the coefficient of performance of the heat pump. Both in the absorber and in the generator, this improvement is implemented by installing a section in which adiabatic absorption/desorption takes place. In the absorber, the adiabatic absorption increases the solution temperature, thus increasing the temperature boost. In the desorber, adiabatic desorption increases the solution concentration with no addition of heat, thus preserving high performance.

FOR ADDITIONAL INFORMATION: Information regarding nonexclusive or limited exclusive licensing is available from the Assistant General Counsel for Patents, Department of Energy, Washington, D.C. 20545. For technical information contact D.W. Jared, Oak Ridge National Lab., P.O. Box X, Oak Ridge, TN 37830; (615) 574-4192. Refer to 444/X/TN.

0311 Accelerated Stability Tests for Diesel Fuels: More reliable techniques are developed for testing the storage stability of diesel type middle distillates

Department of Energy, Washington, DC.

Feb 83 (C, K)

Five test techniques have been evaluated for the determination of the inherent stability of diesel fuels in storage. In particular, the 110F, 175F, and 300F Stability tests, and ASTM (American Society for Testing and Materials) Standard D 2274 were performed using 8 fuels having a wide range of stability. The primary parameters measured included filterable and adherent insolubles, soluble gum, light transmittance and color.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report order number: DOE/BC/10043-25, price code: A04. For information not provided in the report, contact Dennis Brinkman, USDOE, Bartlesville Energy Technology center, P.O. Box 1398, Bartlesville, OK 74005; (918)336-2400.

Acoustic Instrumentation for Coal-Conversion Plants: Acoustic instruments are nonintrusive and respond rapidly

See 0425

0312 Adiabatic Compressed-Air Energy Storage for Utilities: Adiabatic concept holds promise of eliminating costly reheating of compressed air

Department of Energy, Washington, DC.

Feb 83 (C)

A conceptual design and engineering study finds an adiabatic compressed-air energy storage (CAES) system a potentially-attractive energy saver for electric-power utility plants. This system, as opposed to the conventional CAES system, would utilize thermal-energy storage and thus eliminate the need for fossil fuel in reheating compressed air returning from the storage reservoir. Results of the study show the adiabatic concept to be one of the most attractive candidates for utility application in the near future.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PNL-4114, price code: A10.

0313 Assembly of Photovoltaic Arrays: Heat lamps on a trolley melt preapplied solder

National Aeronautics and Space Administration, Washington, DC.

Jun 83 (C, G)

In a new system for assembling photovoltaic arrays, solder and flux are applied to pads on the individual cells by a screen process and then heated to soldering temperature by heat lamps during final assembly. Fixtures with vacuum holdowns keep the cells and interconnecting tabs in proper alignment.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15331/TN.

0314 Bare-Plate Solar Air Collectors: Inexpensive units preheat air for ventilation or drying process

Department of Energy, Washington, DC.

Jan 83 (C)

Prototype collectors have been investigated for their potential as inexpensive units for preheating ambient air. In performance tests and economic analysis, the collectors showed promise for such uses as ventilation for large buildings in winter or agricultural or industrial drying. In design, a fan pulls the air into the system through the airgaps, thus heating the air by contact with the hot metal surfaces. The gaps are designed to cause turbulent airflow.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DOE/R5/10143-T1, price code A04.

Battery-Charger/peed-Controller for Electric Cars: Addition of just a few components allows circuit to perform a dual function

See 0912

Biomethanation of Pyrolysis Gas: Biomethanation should be less expensive than catalytic methanation

See 0397

0315 Carbon Cloth Supports Catalytic Electrodes: New design requires less catalyst

National Aeronautics and Space Administration, Washington, DC.

Aug 83 (B, H, J)

Carbon cloth is the starting material for promising new catalytic electrodes. Originally developed for a sulfur-cycle hydrogen process, the carbon-cloth electrodes are more efficient than the sintered-carbon configuration previously used. They are also chemically stable and require less catalyst - an important economic advantage when the catalyst is a noble metal such as platinum.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15268.

0316 Charging Ni/Cd Cells: Procedure is faster, reduces heating, and yields a higher end-of-charge voltage

National Aeronautics and Space Administration, Washington, DC.

Nov 83 (B, C)

A new procedure for recharging nickel/cadmium batteries is fast and eliminates overcharging. The method charges dead cells using current increments rather than continuous, constant current. The new procedure starts with a low charging rate (C/20) for 8 hours to remove some of the

passive material that adds to the impedance of the electrochemical cell. Then the charging rate is maintained at C/10 another 6 hours. Next, the cell is charged at C/5 until 1.435 volts per cell are reached..

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240 (301) 621-0100 Ext. 241. Refer to GSC-12779.

Chemical Feedstocks From Renewable Resources See 0094

0317 Cleaner for Solar-Collector Covers: A cleaning solution would be pumped over the collector cover
National Aeronautics and Space Administration,
Washington, DC.
Jul 83 (C, D)

A simple self-contained cleaning system has been proposed for solar collectors or solar-collector protective domes. Current cleaning methods are uneconomical because they are labor-intensive or because they require expensive machinery. A thin transparent perforated polymeric film cap would be attached to the top of the dome. A small, low-pressure pump would pump a cleaning solution up under the cap. It would flow out through the perforated cap and then down over the surface of the dome, washing off any dirt.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to:NPO-15414.

0318 Coal Storage Hopper With Vibrating Screen Agitator
Department of Energy, Washington, DC.
Dec 83 (C, D)

A device for improving the flow of wet coal out of storage and feed hoppers has been successfully demonstrated. A vibrating screen support consisting of two or more stacked screens prevents the wet coal from compacting in the lower, tapered portion of the hopper, reducing or preventing the tendency for ratholing and bridging. Metal rods extend below the screens and into the hopper outlet to provide additional agitation. Together, the screens and rods tend to 'sift' the coal rather than allowing it to flow en masse. The potential area of application is in coal conversion and combustion processes that utilize crushed, granular, or powered coal. It should be particularly useful in situations in which the coal must be stored outdoors and drying is minimal or nonexistent.

FOR ADDITIONAL INFORMATION: Contact: D. W. Jared, Oak Ridge National Laboratory, P.O. Box X, Oak Ridge, Tennessee 37830, (615)574-4192. Refer to 467/XTN.

0319 Coal-Mine Methane as an Energy Source: On-site equipment can be powered economically by a byproduct of mining
Department of Energy, Washington, DC.
Aug 83 (C, D)

In coal mining, it is often necessary to remove methane gas from a coal seam so that coal can be removed safely. The methane is collected underground, piped to the surface, and exhausted to the atmosphere as a waste by product of the mining process. An electric-power generation system has been assembled to demonstrate utilization of the methane as an energy source. An 800-kW gas-turbine generator with attendant compression and electrical equipment converted 200,000 cu stdft/day of methane to about 250 kWh of energy.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE81-029791, price code: A10. For information not provided in the report, contact Charles W. Byrer, Morgantown Energy Technology Center, Collins Ferry Road, Morgantown, WV 26505, (304) 291-4547.

Coated Parts for Coal Gasification: Alloy coating protects against corrosion and erosion See 0669

0320 Coefficient of Performance (COP) Meter For Installed Heat Pumps
Department of Energy, Washington, DC.
Dec 83 (C, D, K)

The COP Meter, in a matter of minutes and with a minimum of instrumentation, measures the performance of installed heat pumps. An in situ calibration process determines the mass flow rate and specific heat of the air stream, so sensors to measure these two parameters are not needed. A meter to measure electrical power input to the heat pump and sensors to measure return and supply air temperature provide the input signals to the COP Meter. State-of-the-art integrated-circuit components covert the input signals to a single output signal. A low-cost calculator, which is used as a variable increment counter, receives this output signal. At the conclusion of a test, the integrated COP over the test interval is shown on the calculator display. Laboratory tests have been done, and a prototype design is published in the appendix of the report cited below. Potential users and applications are: heat pump manufactures, heat pump dealers consulting engineers, industrial HVAC engineers, and utilities. With minor modifications, the COP Meter can be used as either a continuous heat flow recorder or an efficiency meter for fossil-fuel-fired heating systems. Thus, the basic instrument has applications for heating systems other than heat pumps.

FOR ADDITIONAL INFORMATION: Information regarding nonexclusive or limited exclusive licensing is available from the Assistant General Counsel for Patents, Department of Energy, Washington, D.C. 20545. Further information may be obtained from D. W. Jared, Oak Ridge National Laboratory, P.O. Box X, Oak Ridge, TN 37830; (615)574-4192. Refer to 470/XTN.

Combined Braking System for Electric Vehicles: Hydraulic/regenerative braking system permits energy recovery for electric vehicles without compromising the braking performance See 0915

0321 Compressed-Air Energy Storage: A comprehensive study examines technical and economic aspects of this technology
Department of Energy, Washington, DC.
Jan 83 (C)

A detailed technical and economic analysis of compressed-air energy storage (CAES), reported in a nine-volume edition, answers some important questions about the benefits of this technology to the electric utility industry. The purpose of the CAES is to eliminate or minimize the need for oil-fired peaking units that are turned on during peak electrical demand.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number of the executive sum-

mary DE82000270, price code: A07 or for information not provided contact C.P. Demos, USDOE, Chicago Operations Office, 9800 South Cass Avenue, Argonne, IL 60439; (312) 972-2000.

Controlling Thermal Gradients During Silicon Web Growth: A slotted susceptor helps keep the melt-replenishment region hot
See 0535

Daylighting Model Provides Key Design Strategies for Commercial Buildings
See 0072

0322 Design Calculations for Thermoelectric Generators: Heat rate, power delivered to load, and thermodynamic efficiency can be calculated with high accuracy
National Aeronautics and Space Administration, Washington, DC.
Sep 83 (C, J)

Nine simplified analytic models based on average properties accurately predict heat rates for silicon/germanium thermo-electric generators. Solutions from these simplified models were compared with those obtained using sophisticated numerical analysis. The maximum errors in calculated heat rate from about 4 percent to about 0.2 percent. The models may also be used to calculate power delivered to a load and thermodynamic efficiency. The models can be selected according to the accuracy needed. Similar average-property models can be used to refine the accuracy of lumped-parameter approximations for electrical transmission lines, flow through chemical reactors, and limit-stressed structural members.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15286.

Dip-Coating Fabrication of Solar Cells: Jets of gas permit rapid production
See 0547

Early Detection of Geothermal Aquifers: Chemical logging prevents damage to geothermal wells and contamination of freshwater aquifers
See 0827

0323 Electrode for Secondary Electrochemical Cells: A new electrode improves cell power capability and also improves cell durability
Department of Energy, Washington, DC.
Jun 83 (B, C)

An improved electrode has been developed for use in secondary electrochemical cells that operate at high temperatures, with a molten salt as electrolyte and a frangible ceramic material as a cell separator. The negative electrode is made of such electrochemically active materials as alloys of alkali metal chalcogenides as iron, cobalt, and nickel sulfides. The electrode structure, which can expand and contract during cell cycling, improves the electrical contact between the electrochemically active material and the current-collector members.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,306,004, which is available from: Commissioner of Patents, Washington, D.C. 20231 for \$1.00. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

0324 Electrolyte Reservoir Would Lengthen Cell Life: A proposed controlled-capillary sump would extend the life of sealed cells that depend on gas recombination
National Aeronautics and Space Administration, Washington, DC.
Jul 83 (D, J)

Certain electrochemical cell types depend on the recombination of gases within them in order to insure long operating lives in the sealed condition without undue pressure build-up. Nickel/cadmium cells, in particular, depend on the recombination of oxygen that is generated on the nickel electrode. It is suggested that an electrolyte sump be placed within these cells below the assembly of anodes and cathodes to supply the proper amount of electrolyte during the course of operation.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: LEW-13788.

0325 Electronic Load Tests High-Voltage Solar Arrays: An adjustable load is provided by a combination of transistors and resistors
National Aeronautics and Space Administration, Washington, DC.
May 83 (B, K)

An electronic load instrument for field and laboratory measurement of photo-voltaic power systems has digital displays of solar-cell-array output current and voltage. It also supplies analog signals for driving an x-y plotter. The instrument has been used to measure current/voltage characteristics of solar-cell arrays with open-circuit voltage of 350 volts and short-circuit current of 2.5 amperes. This type of electronic load is also suitable for testing other types of high-voltage power supplies. Since it is controlled by the voltage signals applied to the gates of the transistors, it could be controlled by electrical signals from other devices to present any sort of time-varying load that might be required. This device has been patented.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Division, P.O. Box 8757, BWI Airport, MD 21240. Refer to NPO-15358/TN

0326 Emittance Measurements of Solar-Collector Surfaces: Calorimetric technique permits measurement of production solar-collector pipes
Department of Energy, Washington, DC.
Jun 83 (C, K)

A technique of measuring total hemispherical emittance of a cylindrical-pipe surface as a function of temperature gives an accurate description of solar absorptance over the entire pipe length. Solar-collector pipes 11 ft long can be inserted into the apparatus and measured as they come out of production. The advantages of this technique include: It provides total hemispherical data. The test is nondestructive, and no computer is required.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-008713, price code: A02 or For information not provided in the report,

contact T.A. Reitter, Lawrence Livermore National Laboratory, Livermore, CA 94550.

Energy Efficient Winning of Aluminum from Ore: Proposed process promises to reduce energy consumption by one-third or more

See 0684

Energy Management Handbooks for Buildings: Comprehensive handbooks describe how, why, and where to save energy in buildings

See 0073

0327 Energy Storage in Hard Rock: Two near-term practical and economic energy-storage systems offer either peaking or intermediate power-generation alternatives

Department of Energy, Washington, DC.

Apr 83 (C)

A preliminary design study was carried out for the two most viable near-term energy-storage alternatives: (1) compressed-air energy storage (CAES) and (2) underground pumped hydroelectric (UPH). Design criteria were determined, and preliminary engineering designs were developed for both of these storage concepts were underground caverns are excavated out of a suitable rock. An evaluation indicates that either technology offers a technically feasible and economically attractive alternative.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE81-029440, price code: A06.

0328 Environmental Durability of Electroplated Black Chromium: Coated aluminum solar panels were tested in rural, industrial, and seacoast environments

National Aeronautics and Space Administration, Washington, DC.

Jul 83 (H)

A report describes tests of the durability of electroplated black-chromium coatings on solar-collector panels in rural, industrial, and seacoast environments for 60, 36, and 13 months, respectively. The black-chromium coating showed exceptionally-good optical durability in all three environments.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25797.

0329 Environmental Impact of High-Voltage Lines: New compact structures are introduced

Department of Energy, Washington, DC.

Nov 83 (D)

A handbook reviews new concepts in electric-power-transmission structures that are not as intrusive on the environment as are the conventional structures. Because the power-transmission-line installations often traverse long distances, the utility companies are prone to delays in obtaining the rights of way from various jurisdictions. Objection raised by farmers, building contractors, and environmentalists, however, can be more equitably resolved if the utilities turn to less conspicuous structures and larger capacity lines (e.g., 1,100 kV). The handbook presents new structural concepts in which the phase-to-phase spacing is considerably reduced and the right-of-way width is thereby decreased. Emphasis is placed on the use of new materials as insulated structural members.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-015505, price code: A11. For information not in the report, contact Thomas W. Reddoch, Oak Ridge National Laboratory, P.O. Box X, Oak Ridge, TN 37830; (615) 574-5222.

0330 Estimating Insolation Incident on Tilted Surfaces: Solar radiation on several types of solar collectors is calculated from ASHRAE relationships

National Aeronautics and Space Administration, Washington, DC.

Dec 83 (A, B)

In designing or analyzing a solar-energy system, the principal question is how much energy system can deliver to meet load demands. One of the main parameters determining the amount of energy the system delivers is the amount of solar energy available (energy incident on the surface of the collector array) to the system. The ASHMET computer program estimates the amount of solar insolation incident on the surfaces of several types of solar collectors, including fixed-position flat-plate, monthly-tilt-adjusted flat-plate, beam-tracking, and fixed-azimuth-tracker. Climatological data for determining the clearness index for 248 U.S. cities are included with the program. The program prompts the user for all required data. It is written in FORTRAN IV Plus.

FOR ADDITIONAL INFORMATION: Contact: COSMIC, Computer Software Management and Information Center, Suite 112 Barrow Hall, Athens, GA 30602.

0331 Evaluating Energy Conversion Efficiency: A family of curves aids in evaluating solar-energy conversion devices

National Aeronautics and Space Administration, Washington, DC.

Sep 83 (C, J)

Devices that convert solar radiation directly into storable chemical or electrical energy, such as photovoltaic, biological photosynthetic, photochemical, and photoelectrochemical, have a characteristic energy absorption spectrum; specifically, each of these devices has an energy threshold. The conversion efficiency of a generalized system that encompasses all threshold devices has been analyzed, resulting in a family of curves for devices of various threshold energies operating at different temperatures. Although the efficiency curves refer specifically to the conversion of solar radiation, they can also be used to find the limits to the conversion efficiency for threshold devices and radiation from a blackbody at any temperature with a simple modification.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: N82-18697, price \$7.00.

Feed System for Coal Gasifier: Inlet arrangement improves combustion and minimizes caking in fluidized-bed reactors

See 0152

0332 Fire Safety of Liquefied Petroleum Gas: Accident probabilities and fire-control methods are discussed

Department of Energy, Washington, DC.

Jan 83 (D)

A collection of three reports addresses some of the issues relating to the safety of liquefied petroleum gas (LPG) in transportation and storage. These studies are part of a con-

tinuing effort to assess the safe handling of LPG. One report contains an analysis of historical data on fatal accidents involving LPG. Another report discusses the fire safety of LPG in marine transportation. The remaining volume describes experiments in the control and extinguishment of LPG pool fires.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order numbers: DOE/EV/06020-T3,...T4,...T5, price codes: A06, A10 and A07 or for information not in the reports, contact Dr. John M. Cece, US DOE, EP-32, Washington, DC 20545; (301) 353-5486.

0333 Four Advanced CAES Concepts: Adiabatic compressed-air energy storage system (CAES) is the most likely candidate

Department of Energy, Washington, DC.

Sep 83 (C, D)

Adiabatic CAES, CAES hybrid, CAES with coal gasification, and CAES with pressurized fluidized-bed combustion were compared for technological readiness, their relative economic benefits, and operational viability. The adiabatic CAES concepts appears to be the most attractive candidate for utility application in the near future. CAES is a technique for supplying electric power to meet peakload requirements of electric utilities. Using low-cost power from baseload plants, a CAES plant compresses air for storage in an underground reservoir.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-019513, price code: A05 for information not in the report contact Dr. Imre Gyuk, U.S. DOE, 1000 Independence Ave, Room 5E, Washington, DC 20585; (202) 252-1508.

0334 Fuel-Efficient Forge Furnaces: Buyer incentives ease introduction and highlight benefits

Department of Energy, Washington, DC.

Nov 83 (C)

A program of the accelerated introduction of high-performance forge furnaces has demonstrated that huge amounts of fuel can be saved--as much as 65 percent of the fuel normally consumed. The furnaces employ a ceramic heat exchanger to recover heat from waste gases, a burner for high-temperature combustion, a controller for fuel/air ratio, and lightweight ceramic-lined steel ducts. The components are available as a retrofit package for existing forge furnaces. A major benefit of the accelerated program was that it allowed a fast and efficient correction of the problems that normally occur in new products.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-010913, price code: A07. For information not in the report, contact Harry L. Brown, EG&G Idaho, Inc., P.O. Box 1625, Idaho Falls, ID 83415; (208) 526-1720.

0335 Gas-Jet Levitation Furnace: Versatile system enables containerless processing of such small objects as glass microballoons

National Aeronautics and Space Administration, Washington, DC.

Feb 83 (G)

A gas jet levitates solid and viscous liquid spheroids at high temperatures in a new contactless processing system. The system can be used to observe high-temperature transfor-

mations (for example, crystallizations without contact with another solid surface) or in containerless studies to eliminate contamination by the crucible. The system could also be used for coating the small spheres or filling them with fuel gas for fusion.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div. P. O. Box 8757, BWI Airport, MD 21240. Refer to MFS-25591.

0336 Geothermal-Well Design Handbook: A straightforward procedure allows the determination of economic feasibility and the comparison of alternative approaches

Department of Energy, Washington, DC.

Nov 83 (C)

A handbook presents a simplified procedure for estimating the performance of geothermal wells produced by natural flows. The user can estimate this performance using a hand-held calculator. The user furnishes data on five parameters: (1) wellbore diameter, (2) depth of the well to the top of the producing zone, (3) temperature of the fluid at the top of the producing zone, (4) total mass flow rate of fluid in the well, and (5) pressure in the wellbore at the top of the producing zone. The user calculates data on what the condition of the thermal fluid at the wellhead would be if the well were constructed, including fluid pressure, fluid temperature, and steam quality, or the percent by weight of steam in the flowing fluid.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-009120, price code: A06. For information not provided in the report, contact James Butz, Denver Research Institute, P.O. Box 10127, Denver, CO 80210; (303) 753-2893.

Gettering Silicon Wafers with Phosphorus: Phosphorus absorbs impurities to improve the efficiency of solar cells

See 0565

0337 Glass for Sealing Lithium Cells: New glass increases the life of lithium cells by a factor of 5

Department of Energy, Washington, DC.

Jul 83 (C, H)

A new corrosion-resistant glass increases the working life of Li/SO₂ cells to 5 years. Highly reactive chemicals degrade conventional glass by reduction of its bulk oxides. The coefficient of expansion of the new glass ranges from 45 x 10 to the -7th to 85 x 10 to the -7th/C; glass resistance is 8 x 10 to the 10th ohms. The glass has a sealing temperature within the range of 900 to 1,050C, which allows it to be used in commercial furnaces.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-013617, price code: A02 or for licensing information contact: Office of Assistant General Counsel for Patents, US DOE, Washington, D.C. 20585.

Hangar Heating Conservation II: Flexible Vinyl Strip Doors

See 0074

0338 Heat Pipes Cool Power Magnetics: Configurations originally developed for space use are effective in any orientation

National Aeronautics and Space Administration,
Washington, DC.

Jun 83 (B, D)

A high-frequency, high-power, low-weight transformer and inductor developed for space use were redesigned with heat-pipe cooling, which allows both a reduction in weight and a lower internal temperature rise. These particular magnetic devices are used in the power stage of a 3-kW ion-beam thruster. The use of heat pipes to cool power magnetics imposes a severe problems when performing testing on Earth. The Earth's gravity field has an effect upon the heat-pipe wicking. If several heat pipes are required, as in modular designs, or if they are used in conjunction with a heat sink cooled by heat pipes, the packaging constraints of keeping all heat pipes horizontal for Earth test become so severe that their use becomes impractical. These newly-developed heat-pipe configurations overcome this limitation. The heat pipe exploits the ability of the electrostatic shield to draw heat from the primary and secondary coils of the transformer.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: NASA/CR-159659, price code:A09.

Heat-Pump Community Energy Systems: Entire districts can be heated and cooled in an economically attractive, environmentally acceptable way

See 0076

Heat-Pump Water Heater: Latest designs offer considerable energy savings and short payback periods

See 0077

0339 Heat-Transfer Fluids for Solar Collectors: Survey characterizes 50 commercially available fluids

Department of Energy, Washington, DC.

Feb 83 (C, H)

A Survey of manufacturers of solar collectors has characterized heat-transfer fluids to help solar-collector system designers select the most appropriate fluid for the systems. A questionnaire sought information about: (1) limiting properties of the fluids; (2) design properties, such as density, viscosity, specific heat; (3) handling properties, such as compatibility with other materials, chemical sensitivity; and (4) prices. The fluids exhibit thermal stability problems in concentrating collectors at upper temperature levels.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report order number: ALO-35356-2, price code: A10.

0340 High-Efficiency Solar Cells on Low-Cost Substrates: Epitaxial layers are grown on substrates of commercial-grade silicon

National Aeronautics and Space Administration,
Washington, DC.

Jan 83 (C)

High-efficiency solar cells are made in thin epitaxial films grown on low-cost commercial silicon substrates. The cost of the cells is much less than if high-quality single-crystal silicon were used for the substrates, and the performance of the cells is almost as good.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer, P.O. Box 8757, BWI Airport, MD 21240. Refer to NPO-15039.

0341 High-Energy Sulfuryl Chloride Batteries: These new batteries offer unprecedented power and energy density

Army Materiel Development and Readiness Command,
Alexandria, VA.

Nov 83 (C, J)

A report discusses an evaluation of sulfuryl chloride batteries. These batteries have high-energy storage capacity and are well-suited for portable electronic equipment. In the evaluation, which was conducted by the U.S. Army Electronics Research and Development Command, several types of electrochemical cells were compared, two of which employed sulfuryl chloride. The liquid-cathode cells successfully violate the rule requiring separation of reactants are in contact, since the cathode is liquid, their direct chemical reaction is hindered by a thin protective layer of salt on the cathode.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A117106, price code: A02 or contact project officer Sol Gilman (201)544-2349.

0342 High-Rise Heat Pipe: Addition of a gas allows pipe to raise working field over considerable vertical distance

Department of Energy, Washington, DC.

Dec 83 (C, D)

A completely-passive heat pipe operates against gravity for vertical distances of 3 to 7 m. The pipe can be used in solar-energy space heaters and water heaters to transfer heat from rooftop collectors to thermal-storage units in the basement or in the ground. The pipe encloses a gas, such as air, and a working fluid, such as water. Initially, the gas is evenly distributed throughout the heat pipe. Heat applied to the evaporator section of the pipe produces working-fluid vapor from a wick material lining the evaporator.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,366,837, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1. For licensing information contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

High-Temperature Turbodrill: Directional drilling system penetrates hot granite in deep geothermal wells

See 0832

Hydride Compacts for Hydrogen Storage: Process improves these compacts, making them suitable for the safe storage of hydrogen

See 0104

Identification of Synthetic Fuels: Chromatographic techniques allow rapid identification of base stocks

See 0105

0343 Improved Anode Connections for Li Batteries:

Design changes on electrode stacks improve the anode connections to the negative terminal post

Army Materiel Development and Readiness Command,
Alexandria, VA.

Mar 83 (B, C)

A study, sponsored by the U.S. Army Electronics Research and Development Command, produced improved anode connections of a high-rate, spirally-wound, flat, cylindrical, D-type cell. The cell had been developed for 24-V lithium/thionyl chloride batteries for portable manpack radios and laser applications. In the improved cell design, the anodes are clamped against a solid, stainless-steel centerpost.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A093140, price code: A03 or contact project officer N. Hamilton (201) 544-4258.

0344 Improved Electrolytes for Rechargeable Lithium Batteries: Electrolyte conductance and cathode rate capability are increased

Army Materiel Development and Readiness Command, Alexandria, VA.

Oct 83 (C, J)

The effects of electrolyte stability, viscosity, and conductance were investigated for improving the performance of rechargeable lithium batteries. The study was conducted by the U.S. Army Electronics Research and Development Command. Electrolyte stability (against lithium) improves battery efficiency by reducing the buildup of passivating films on electrodes from lithium/electrolyte reaction products. Results (see figure) showed that the DME electrolyte increased the current density fivefold over the PC electrolyte at the same cathode potential.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A105 230, price code: A02 or contact project officer Herbert F. Hunger (201) 544-4210.

Improved Heat-of-Fusion Energy Storage: Alkali metal/alkali-halide mixtures are proposed for preventing solid buildup during energy recovery

See 0107

0345 Improved Testing of Multicell Batteries:

Continuous-scan solid-state instrument can overcome difficulties encountered in such tests

Department of Energy, Washington, DC.

Mar 83 (A, B, C, K)

A microprocessor-based instrument proposed for testing the performance characteristics of full-size electric-vehicle batteries holds promise of overcoming the difficulties inherent in multicell testing. The instrument, either in a stand-alone mode or interfaced with a computer-automated measurement and control (CAMAC) system, rejects common mode voltages - which can reach 300 V - while allowing the measurement of individual cell voltages. The key lies in data reduction algorithms that minimize the amount of data passed to a central computer through the CAMAC system.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-007032, price code: A03.

Inexpensive Antireflection Coating for Solar Cells: Titanium oxide is applied in a continuous spraying process

See 0715

0346 Innovative Biomass Gasifier in Final Research Stages

Department of Energy, Washington, DC.

May 83 (C, D)

Research is continuing on the stratified downdraft gasifier toward further improvement in its performance. The first gasifier designed specifically for the production of methanol from biomass, the 1-ton-per-day prototype received an award as one of the most significant technological developments in 1982. Methanol from the synthesis gas produced by the gasifier is suitable as a fuel for engines and turbines. Used in agricultural applications, the gasifier might be scaled up from the prototype to a 120-tons-per-day plant for farm use. Such a unit could produce about 5.5 million gallons of methanol a year at competitive prices.

FOR ADDITIONAL INFORMATION: Contact: Dr. Thomas Reed, Solar Energy Research Institute, Golden, CO 80401; (303) 231-1437.

0347 Integrating Resource Recovery and District Heating Development for Urban Energy Systems

Department of Energy, Washington, DC.

Jun 83 (C, D)

Hot-water district-heating systems have the potential for providing the heating requirements for northern U.S. urban areas at competitive costs and high fuel efficiency using plentiful domestic fuels. Resource recovery of municipal solid waste by material separation and conventional combustion offers a potential source of heat for a district heating system as well as industrial process steam. A study was performed to assess the advantages and disadvantages of utilizing thermal energy from a municipal solid-waste-fueled resource recovery facility as a heat source for a developing district heating system in St. Paul. Based on information on waste flows and industrial process steam markets from St. Paul authorities, an analysis of energy products (steam, hot water, and electricity) and break-even process economics was performed for a 1000-ton/day capacity resource recovery facility. The study would be of interest to cities and counties that may be considering district heating and/or resource recovery from municipal solid wastes, particularly community and regional energy planners.

FOR ADDITIONAL INFORMATION: Contact: D.W. Jared, Oak Ridge National Laboratory, P.O. Box X, Oak Ridge, TN 37830; (615) 574-4192. Refer to 446/X/TN.

0348 Lightweight Flat-Plate Solar Collector: This collector features low-cost components and simplified installation

Department of Energy, Washington, DC.

Aug 83 (C)

A simple flat-plate solar collector incorporating polymer films in the window and absorber/heat exchanger is constructed in such a way that the films add structurally to its rigidity. The collector window is a high-strength weather-resistant plastic film 0.0002 to 0.0004 in. thick. This material is thermally stretched over the front and back surfaces of the panel and adhesively bonded to the frame. A rigid polymer-foam core forms the rear thermal-insulating barrier. This type of absorber/heat exchanger can operate efficiently with the water entering through a top header and down between the channeled laminate influenced by gravity. Because the panels are of very light construction (0.7 lb/sq ft) they may be clustered in a folded arrangement to facilitate installation for reduced installation cost.

FOR ADDITIONAL INFORMATION: The patent on which this technical note is based is U.S. Patent 4,327,707 which is available from: Commissioner of Patents, Washington, DC 20231 for \$1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. DOE, Washington, DC 20585.

0349 Lithium Batteries With Sulfuryl Chloride

Electrolyte: With the right type of carbon cathode, sulfuryl chloride cells perform better than the more-common thionyl chloride cells

Army Materiel Development and Readiness Command, Alexandria, VA.

Jan 83 (C)

A study has examined polarization and discharge curves for sulfuryl chloride reduction at electrodes fabricated from various carbon powders. The purpose of the study, conducted by the U.S. Army Electronics Research and Development Command, was to examine the practicability of lithium/sulfuryl chloride electrochemical cells. Such cells have been relegated to a secondary role in favor of the more-generally-accepted lithium/thionyl chloride system.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A100042, price code: A02 or contact project officer S. Gilman (201) 544-2349.

0350 Lithium Battery Safety

Department of the Navy, Washington, DC.

Mar 83 (C)

At the present time, the major barrier to the full utilization of state-of-the-art lithium batteries is that they have not been demonstrated as safe for Navy applications. This has been evidenced by numerous safety incidences involving unexpected and unexplained explosions, fires, and venting of toxic gases associated with the storage, use, and disposal of these cells and batteries. Scientists and engineers at the Naval Surface Weapons Center (NSWC) are working in alerting the Navy battery user community to the possible hazards represented by the indiscriminate and uninformed use of this technology. The test and evaluation of lithium batteries require the utilization of unique facilities which are available at NSWC and include: Explosive bunkers and turrets, explosive pressure vessels, dry rooms and boxes, shock and vibration facilities for explosives, drop tower facilities, and ability to carry out sophisticated physical, mechanical, and chemical failure analysis.

FOR ADDITIONAL INFORMATION: Contact: Dr. R. Frank Bis, Electrochemistry Branch, Naval Surface Weapons Center, Dahlgren, Virginia 22448; (202) 394-1299.

0351 Low Grade Heat Conversion to Mechanical Energy: Solid-state engine operating with shape-memory material

Department of Energy, Washington, DC.

Aug 83 (C, A)

A solid-state engine operates by the shape-memory (SM) wires, which convert heat to mechanical energy. The engine is well-suited for utilizing low-temperature heat contained in the wastewater from homes, factories, central power stations, office buildings, and water heated by solar energy. It also has a potential use in space. The engine consists of several 'deriving' units fixed side by side on a shaft. Each unit consists of a hub that is centrally suspended by a number of SM wires connected to the spokes fixed on the shaft.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,302,939, which is available from: Commissioner of Patents Washington, DC 20231. For licensing information, contact: Office of Assistant General Counsel for Patents U.S. Department of Energy Washington, DC 20585.

0352 Low- to Moderate-Temperature Geothermal Reservoirs: A handbook aids the evaluation of resources

Department of Energy, Washington, DC.

Oct 83 (C)

A two-volume handbook presents guidelines for exploiting low- to moderate-temperature geothermal reservoirs. Such resources, which provide water and steam at temperatures ranging from less than 90C to about 150C, will augment future energy needs of process-, space-, and district-heating systems in agricultural and industry. The handbook aids developers and consultants in evaluating reservoir characteristics. It contains sections on reservoir classification, conceptual modeling, testing during drilling, the current theory of testing, test planning and methodology, instrumentation, and a sample computer program. Appendices cover units and conversions, a glossary of terms, instrumentation, the fabrication of instruments, a program user's guide, and a reference bibliography.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report order numbers: DE82-018405 and DE82-016282, price codes: A05 and A06. For information not provided, contact Max Dolenc, EG & G Idaho, Inc., P.O. Box 1625, WCB E-3, Idaho Falls, ID 83415; (208) 526-0030.

0353 Low-Cost Electrically-Heated Glass Panels: Simple process converts reflective glass into electrically heated panels

National Aeronautics and Space Administration, Washington, DC.

Nov 83 (H)

An inexpensive process converts architectural reflective-coated glass into electrically heated panels. The technique utilizes the reflective layer as a heating element and saves the production costs of applying or embedding heating elements in ordinary glass. The resulting panels have many applications, including automobile windows, home-heating panels, temperature-controlled windows or containers, and food-warming trays. The glass can be maintained indefinitely at temperatures in excess of 100 C. In the conversion process, an electric potential breaks down the high-resistance outer protective layer and brings the reflective film into electrical contact with electrodes on the surface. The reflective film can then be used as a resistance heating element while the protective layer still insulates it from the environment.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15753/TN.

0354 Maintenance-Free, Sealed Lead/Acid Battery: Battery operates at 80 percent energy efficiency with lifetime of 5 to 7 years

Department of Energy, Washington, DC.

Aug 83 (B, C)

A sealed, 6-V, 100-Ah, lead/acid battery was developed for a wide range of photovoltaic applications. The battery is

characterized by a 6-h, nominal discharge rate; 80 percent depth-of-discharge daily duty cycle, for a lifetime of 1,000 cycles; a recharge time of less than 8h; a self-discharge rate of less than 1 percent per week. The positive electrodes are constructed with a low-antimony alloy; the negative electrodes, from a lead/calcium/tin alloy. A totally maintenance-free sealed operation was achieved by designing the cells so that only oxygen is generated on charge....FOR DETAILED INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-014614 price code: A05 or contact Dr. Harry Saxton, Sandia National Laboratories, Albuquerque, NM 87185, (505) 844-6359.

0355 Making Electrodes for High-Temperature Cells: Negative-electrode material for electrochemical cells is easily formed to complex shapes
Department of Energy, Washington, DC.
May 83 (C, G, H)

A new technique overcomes some of the limitations of earlier methods of making negative negative electrodes for secondary electrochemical cells containing molten-metal halide electrolytes. No high temperatures are required as in sintering, nor is one limited to flat, rectangular shapes as in the case of conventional cold pressing. Moreover, brittleness of an electrode material is not a complicating factor as in older pressing methods. A particulate mixture is formed of a Li/Al alloy and either Al₅Fe₂ graphitized carbon. The slurry technique does not develop the stresses that cause bowing and warping in dry-pressed electrodes. FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PAT-APPL-287856, price code: A02. For licensing information, contact: Office of Assistant General Counsel for Energy, Washington, DC 20585.

0356 Marine Thrusters for Ultra-Low-Head Hydropower: A standard supertanker component can produce electricity economically from streams having heads of 3 meters or less
Department of Energy, Washington, DC.
Jan 83 (C, D)

Marine thrusters can produce ultra-low-head hydropower at an equipment cost only one-third to one-tenth that of conventional hydroelectric generators, a study has shown. The estimated average cost of the ultra-low-head marine-thruster package is \$260 per kilowatt-hour. Now, the energy in waterflows having heads of 3 meters or less can be exploited economically. Marine thrusters are shrouded fans used to propel and maneuver such large ships as tankers and to stabilize oil rigs. Marine thruster fans are less expensive than conventional hydroelectric turbines and are available from manufacturers almost off the shelf.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82004813, price code: A10 or for information not provided in the report con-

tact Michael J. McLatchy, USDOE, Idaho Operations Office, 550 Second Street, Idaho Falls, ID 83401; (208) 526-0086.

Measuring Heat Flow in Geothermal Fields: Dual transducers yield data on vertical flux
See 0840

Methane Enhancement in Landfills: Managing key parameters in landfills improves methane gas production
See 0414

0357 Modular Molten-Salt Electrochemical Cell: Modules make cell rugged and easy to assemble
Department of Energy, Washington, DC.
Sep 83 (C)

A high-temperature molten-salt electrochemical cell is composed of modules. Cell components including electrode and electrolytic salt are integrated as a module, and many such modules are inserted in the cell housing. A module provides support for the porous, ceramic, interelectrode insulating material (such as boron nitride), which otherwise could be easily crushed, crumbled, or punctured. The module also makes it unnecessary to fill the cell with molten electrolyte and to degas it.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,313,259, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. DOE, Washington, DC 20585.

Monitoring Spent Geothermal Water: Instrumentation warns if geothermal fluids pollute groundwater after they returned to earth
See 0415

0358 Multiple-Junction Solar Cells: A method of producing multiple-junction solar cells opens a way to silicon as substrate material
Department of Energy, Washington, DC.
Sep 83 (B, C)

Devices called monolithic cascade converters have used GaAs as substrate material in the fabrication of multiple-junction devices. A proposed approach of producing these solar-to-electric energy converters allows silicon to be used as substrate material. Silicon costs less than one tenth as much as GaAs and has a thermal conductivity of about three times that of GaAs. Lattice mismatch between silicon and other materials, however, has prevented the fabrication of such cost-effective energy converters. A means of forming a dislocation-blocking region, called a superlattice layer structure, eliminates this obstacle.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,278,474, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. DOE, Washington, DC 20585.

0359 Multiple-Panel Cylindrical Solar Concentrator: Multipanel trough reflector does not require precise orientation toward Sun
National Aeronautics and Space Administration, Washington, DC.
Nov 83 (C)

A solar concentrator composed of many flat-plate mirrors is efficient even when pointing away from the Sun by as much as 5 deg. Its concentration ratio is 10 or more with a rela-

tively-small reflector area. The concentrator is designed to back-light an array of photovoltaic cells; that is, to illuminate solar cells pointing toward the concentrator rather than toward the Sun. Unlike ordinary backlit concentrators, which employ parabolically curved reflectors, the multiple-flat-plate concentrator does not dramatically lose its effectiveness when it is slightly out of alignment with the Sun. The plates are arranged in a trough, the cross section of which approximates a parabola. The multiple-flat-plate design offers potential cost reduction and ease of fabrication.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15627/TN.

New Computer Program Helps Pick Solar, Energy-Saving Strategies

See 0078

New System Monitors Fuel and Water Levels In Storage Tanks

See 0472

0360 A New Use for High-Sulfur Coal: High-sulfur coal could be used without environmental liability

National Aeronautics and Space Administration, Washington, DC.

Jul 83 (C)

A new process would recover some of the economic value of high-sulfur coal. Although high-sulfur content is undesirable in most coal-utilization schemes (such as simple burning), the proposed process prefers high-sulfur coal to produce electrical power or hydrogen. In the proposed process, the coal is dissolved in H₂SO₄ at the boiling point of 330C. The reaction between the coal and the acid produces sulfur dioxide, carbon dioxide, and water vapor.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15194.

Nondestructive Testing of Light Sensitive Semiconductors: Defects in solar cells are revealed from their intrinsic internal resistance when they are forward biased

See 0473

On-Line Monitoring of Coal/Oil Mixture Fuel: An evaluation is made of instruments that measure key parameters of coal/oil fuel on line

See 0475

0361 Optimizing Energy Savings in Textile Finishing: Guidelines tell how to optimize energy usage in fabric drying and fabric dyeing.

Department of Energy, Washington, DC.

Jul 83 (C)

Guidelines have been developed for optimizing energy usage in two types of textile finishing operations: (1) fabric drying in tenter-frame dryers and (2) fabric dyeing in batch-operated dye becks. Fabric drying processes consume about 50 percent of the energy used by textile dyeing and finishing plants, and about 25 percent of this amount is used in tenter-frame dryers.

FOR ADDITIONAL INFORMATION: Contact: John N. Beard, Jr., Department of Chemical Engineering, Clemson University, Clemson, SC 29631; (803) 656-3056.

Overheat Prevention in Solar-Powered Stirling Engines: Power output would be regulated according to solar-energy input

See 0157

0362 Overview of Coal/Oil-Mixture Technology: Technical problems and solutions are outlined

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 (C)

The production and use of coal/oil mixtures as fuels are discussed in a brief report of the U.S. Army Facilities Engineering Support Agency. The report gives a history of technical development from the point of view of industrial and Government experiences in production of the fuel mixture, stabilization (i.e., preventing the separation of coal and oil), and combustion. A bibliography and a list of industrial coal/oil-mixture suppliers and users are included. The report concludes with an analysis of the considerations involved in the possible use of coal/oil mixtures at Army installations. Because the technical requirements of such facilities may be similar to those of small industrial plants, this qualitative discussion of the economics of conversion to coal/oil mixtures may be of value to potential users in the private sector.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A113533, price code: A03 or contact project officer James F. Thomson (703) 664-6041.

0363 Parallel Connections Would Improve Array Reliability: Extra tabs along equipotentials would salvage functioning cells in a fractured string

National Aeronautics and Space Administration, Washington, DC.

Mar 83 (C)

A pattern of interconnecting tabs proposed for arrays of photovoltaic cells would be superior to simple end connections of strings. By placing tabs along equipotentials of adjacent strings, 'good' portions of a string would not be lost even if one or more of the string elements fracture. The two-dimensional connection pattern also provides strength and structural integrity. The completed array can be moved as a unit and should withstand the lateral forces that tend to displace cells during the double-glass lamination process.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15310/TN.

Passive Cooling and Heating With Heat Pipes: Systems require no active controls or human intervention

See 0081

0364 Photovoltaic Buyers Guide: Presently available technology is reviewed for potential users

Department of Energy, Washington, DC.

Mar 83 (C)

A product directory and buyers guide has been published as an aid to purchasers of photovoltaic equipment. Up-to-date information on the photovoltaic industry, including approximate list prices for specific items, is presented to help

in the selection of commercially-available photovoltaic systems and components. The directory covers: basic definitions; ready-to-use products and systems; guidelines for system design and product selection; custom-built components and systems; a guide to the choice between photovoltaic and other systems, discussing such factors as reliability, cost, performance; a summary of the experiences of users of photovoltaic systems in the Western United States.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number : PNL-3853, price code: A04 or for information not in the report contact Vincent N. Rice, CE-333, U.S. DOE, 1000 Independence Avenue, SW., Washington, DC 20585.

Pipe Heat Transfer Calculation

See 0082

0365 Portable I/V-Curve Tester: Battery-operated electronic load displays current/voltage characteristic on a portable oscilloscope

National Aeronautics and Space Administration, Washington, DC.

May 83 (B, C, K)

A load-simulator circuit measures the current/voltage characteristics of photo-voltaic solar-cell arrays. Since low-power, complementary-metal-oxide-semiconductor integrated circuits are used, a 9-volt transistor-radio battery could power the circuit for field use.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15266/Tn.

0366 Prepolymer Syrup for Encapsulating Solar Cells: N-butyl acrylate polymer/monomer syrup can be used for dipping and coating

National Aeronautics and Space Administration, Washington, DC.

Mar 83 (C, G, H)

A clear polymer syrup, made by dissolving n-butyl acrylate prepolymer in the monomer, can be used to encapsulate solar cells by any of three standard processes (dipping, multiple coating, or automated machine coating). The use of cyclohexane instead of a methanol/water solvent during the initial polymerization stage maintains high molecular weight and raises the yield of linear polymer to essentially 100 percent.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Division, P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15154/TN.

0367 Pressurized Paraboloidal Solar Concentrator: Proposed pressurized reflector has a rigid substrate

National Aeronautics and Space Administration, Washington, DC.

Feb 83 (C)

A proposed pressurized solar concentrator would give significantly higher concentration ratios than a previous design. Instead of allowing the pressurized metalized film to assume its natural semispherical shape, as in the previous concept, it would be forced into a paraboloidal shape by a rigid substrate. The construction of pressurized reflectors would be less expensive than for rigid concentrators, since the reflective surface, which is a low-cost metalized polymer film, can be quickly and easily replaced.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div., P.O. Box 8757, BWI Airport, MD 21240. Refer to NPO-15427/TN.

0368 Process for Pelletizing Lignite: Commercially competitive lignite can be produced at \$18 per ton

Department of Energy, Washington, DC.

Jun 83 (C, D)

A continuous process for pelletizing raw lignite, requiring minimal pretreatment, was scaled up from 5 to 50 tons per day to produce low moisture content pellets of sufficient strength for handling, shipping, and prolonged storage. Pelletizing is important, since freshly mined lignite has a high moisture content and low caloric value that make shipping expensive and boiler performance low.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-012007, price code: A03 or for information not provided in the report(s) described here, contact Dr. Wu-Wey Wen, U.S. DOE, Pittsburgh Mining Technology Center, P.O. Box 10940, Pittsburgh, PA 15236; (412)675-5713.

0369 Program Makes Major Advance in Li/O₂ Reserve Battery Development

Department of Navy, Washington, DC.

Feb 83 (C)

The Naval Surface Weapons Center and Honeywell Power Sources Center have successfully designed, developed, fabricated, and evaluated experimental ruggedized reserve 12-volt lithium-sulfur dioxide (Li/SO₂) batteries having 100 Ahr capacity. These are the first large rugged reserve Li/SO₂ batteries developed in the United States. Their unique features include: ability to withstand extreme shock, rapid activation, long operating life, and maintenance-free uncontrolled temperature storage.

FOR ADDITIONAL INFORMATION: Contact: Navy Technology Transfer, Code E411, Navy Surface Weapons Center, Dahlgren, Virginia 22448. Refer to 070901/TN.

0370 Progress in Wind-Wheel Turbines: Efficient turbine concept shows promise in preliminary tests

National Aeronautics and Space Administration, Washington, DC.

May 83 (D, C)

A new wind turbine offers important advantages over conventional propeller wind turbines according to theoretical studies and tests of small working models. The project results are described in a final report that is now available. Because of their simple construction, it seems likely that wind-wheel turbines will cost less to build and operate, at the same time, wind wheels are just as efficient as conventional wind machines in extracting energy from moving air. Wind wheels operate at lower rotational speeds and therefore are less subject to vibratory stress and fatigue. They also produce higher torque-useful for powering pumps and similar machines.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25796/TN.

0371 Rechargeable Lithium Batteries: A sealed D-size lithium cell with a vanadium oxide cathode has excellent cycling characteristics

Army Materiel Development and Readiness Command, Alexandria, VA.

Jul 83 (B, C)

The U.S. Army Electronics Research and Development Command has sponsored a study of vanadium oxide (V6013) for use as a high-energy cathode material in rechargeable, secondary lithium cells. The major areas of investigation were: 9a) the synthesis and characterization of V6013, (b) an evaluation of the rechargeability of V6013, and (c) the construction and testing of hermetically sealed cells.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A093038, price code: A04 or contact project officer K. M. Abraham (201) 544-4258.

Reducing Costs of Carpet Finishing: Conserving materials as well as energy greatly reduces process costs

See 0745

0372 Reflective-Shield Radiative Cooler: Angled thin reflectors form cavity radiators that reflect heat out into space

National Aeronautics and Space Administration, Washington, DC.

Feb 83 (D)

Recent tests show that a radiative cooler consisting of several thin reflective shields with a slight angle between them redirects the flow of heat very effectively. Heat that flows toward the surfaces of the shields enters a triangular cavity and is radiated out to the side. Experiments have confirmed the effectiveness of this heat-shielding technique. The shields were aluminized polyester, supported by polyester cords with an angle of about 1.5 between them. The shield can be used for deflecting virtually any level of thermal radiation in vacuum. In air, only relatively high intensity thermal radiation can be deflected by this technique; but even so, it may be useful in constructing reflecting baffles in front of ovens or furnaces.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div, P.O. Box 8757, BWI Airport, MD 21240. Refer to NPO-15465/TN.

Refuse/Oil Fuels for Industrial Boilers: Technology is available for producing such fuels

See 0421

Researchers Develop Computer Program To Study Thermal Performance

See 0084

Retrofitting Passive Solar Heating: A sourcebook offers advice for individual, community, and governmental action

See 0085

RF Simplifies Recovery of Heavy Oils: RF heat thins the heavy oil, making the recovery more economical

See 0848

0373 Safety Standards for Wind-Energy Systems: Risk and hazards are identified, and recommendations for safety standards are made

Department of Energy, Washington, DC.

Jul 83 (C)

Small wind-energy conversion systems (SWECS) use wind energy to generate electrical or mechanical power as conventional windmills or other types of wind-driven machines. An evaluation of the risks and hazards associated with the use of SWECS, along with safety standards, are essential for their commercial acceptance.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-015400, price code: A06, or for information not in the report, contact Darrell Dodge, Rockwell International, Wind Systems Program, Golden, CO 80402; (303) 497-7174.

Saving Energy Costs in Plywood and Veneer Industries: A handbook advises on simple, fast-payback methods

See 0750

0374 Sealants for Thermal Solar-Collector Cells: Evaluation characterizes the performance of these sealants under various conditions

Department of Energy, Washington, DC.

Feb 83 (H)

An extensive literature survey, followed by laboratory screening tests, was used to select candidate class PS (preformed rubber seal) elastomers for more-comprehensive laboratory testing, to assess their performance capabilities under the harsh environment of a thermal solar-collector cell. Tests included thermal aging in air, hydrolytic stability, weathering resistance, the corrosion of metallic substrates, ozone resistance, and fungal susceptibility. Elastomers included silicones, fluorocarbons, acrylates, and EPDM.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DOE/CS-15362-1, price code: A09.

0375 Sealants Suitable for Flat-Plate Solar Collectors: Study evaluates 20 materials for suitability under various operating conditions

Department of Energy, Washington, DC.

Feb 83 (C, H)

A study evaluates 20 sealants for suitability in flat-plate solar collectors. One major criterion applied to 10 elastomeric polymer formulations was to see whether the materials could retain their properties at about 400F, the maximum temperature anticipated if the flow of the heat-exchanging fluid is interrupted or if concentrating mirrors and lenses are incorporated in the design. Ten commercial one-component and two-component sealants based upon polysiloxane rubbers were also evaluated for heat resistance, application properties, fogging potential, and adhesion to galvanized metal, aluminum, and glass. A fluorinated elastomer showed the best retention of physical properties at high temperatures.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DOE/CS/35303-T1, price code: A04.

Self-Monitoring High-Voltage-Line Insulators: A dye or pressure gage on the insulator reveals small damages prominently

See 0282

0376 Short-Circuit-Proof Electric Match: Heat-shrinkable tubing protects leads after ignition

Department of Energy, Washington, DC.

Apr 83 (C)

The leads of an electric match can be protected from short circuits, after firing by a sheath of heat-shrinkable plastic tubing. Electric matches, which are used to activate thermal batteries, have a solid cylindrical body with a cavity at one end for ignition powder. Electrical leads extend through the body to the cavity; a bridgewire, in contact with the ignition powder, extends across the leads. A sheath of polyolefin is placed over the match body so that it extends a short distance over the ignition powder. When it is heated by the burning ignition powder, the sheath shrinks, covering the electrical leads.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: SAND-80-0269C, price code: A02. The patent document on which this technical note is based is U.S. Patent 4,299,168, available for \$1.00 from: Commissioner of Patents, Washington, DC 20231.

Silicon Sheet Quality Is Improved By Meniscus Control: Automatic control ensures more uniform silicon sheets

See 0631

0377 Simplified Heat-Source/Thermionic Converter:

Heat is transferred by radiation across a vacuum gap

National Aeronautics and Space Administration, Washington, DC.

Apr 83 (D)

A new design for a nuclear-powered electric generator simplifies its assembly and reduces its size and weight, intended to supply 120 kW for propulsion of a spacecraft, the generator uses a nuclear reactor to produce heat, which is then transformed into electricity by an array of thermionic converters. The new design concept would be also applicable to terrestrial and non-nuclear thermionic power supplies.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div., P.O. Box 8757, BWI Airport, MD 21240. Refer to NPO-15278/TN.

0378 Small Solar Receiver Uses Carbon Particles to Efficiently Produce Heat

Department of Energy, Washington, DC.

Feb 83 (C, D)

Sunlight and 'smoke' have been combined to produce 30 kilowatts of thermal power in an advanced solar receiver. The device called SPHER, for Small Particle Heat Exchange Receiver, has been tested successfully. The thermal power produced by SPHER could be used to drive a turbine to generate 10 kilowatts of electricity. With minor design modifications, a receiver similar to the one tested might produce as much as 300 kilowatts of thermal power--enough power to run a fair-sized ranch or serve a small community. The 'smoke' used by SPHER is actually a very low concentration of carbon particles generated by pyrolyzing acetylene to produce carbon black. The key to the process is the enormous surface area provided by a very small mass of submicron carbon particles, and the ability of the particles to absorb light and transfer the resulting heat to the air stream without becoming significantly hotter than the gas. It is highly efficient, is simple in design, and light in weight.

FOR ADDITIONAL INFORMATION: Contact: Mr. Robert Morris, Office of Technology Applications, Lawrence Berke-

ley Laboratory, University of California, Berkeley, CA 94720; (415) 486-6502.

0379 Solar Air Heating with Auxiliary Heat Pump: A state-of-the-art system has been built and operated

Department of Energy, Washington, DC.

Feb 83 (C)

Performance measurements have been made on a forced-air heating and cooling system employing a solar air collector, a heat pump, pebble-bed storage, and electrical-resistance auxiliary heating. The design, employing commercially available components throughout, is of a type recommended for residential and small office buildings. The system is versatile, offering many different heating and cooling modes. The system has exhibited an overall 29-percent utilization of incident solar energy.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DOE/CS/30122-4, price code: A10 or for information not provided in the report, contact Susumu Karaki, Colorado State University, Solar Energy Applications Laboratory, Fort Collins, CO 80523.

0380 Solar Cells From Metallurgical-Grade Silicon: Less-pure material yields acceptable properties with an epitaxial process

National Aeronautics and Space Administration, Washington, DC.

Jan 83 (C)

Epitaxial deposition produces acceptable solar cells from metallurgical-grade silicon. Instead of diffusing dopants into the silicon to form a pn junction, the junction is formed by growing an epitaxial layer - one having a crystal structure continuous with that of the substrate - on metallurgical-grade silicon.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer, P.O. Box 8757, BWI Airport, MD 21240. Refer to NPO-15042.

0381 Solar Coal Gasification: Reaction generates a versatile product containing more energy than the original coal

Department of Energy, Washington, DC.

Mar 83 (C, D)

Solar coal gasification is potentially an attractive commercial process. Coal can be gasified by reacting it with steam or carbon dioxide in the focal zone of a solar central-receiver plant. The product gas has greater heating value than the initial coal, since the gas absorbs energy from the sun in the gasification reaction. The process thus has the dual attraction of upgrading coal to more easily utilized form of fuel and of chemically storing energy.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report. Order number: UCRL-84610-84610 Rev. 1, price code: A02 or for information not in the report contact Dr. William R. Aiman, Lawrence Livermore National Laboratory, P.O. Box 808 (L451), (415) 422-7327.

0382 Solar Heat Regenerates Electrochemical Cell: Spent electrolyte can be restored at a relatively low temperature

Department of Energy, Washington, DC.

Jun 83 (C, J)

An electrochemical concentration cell can be regenerated at moderate temperatures- about 300 C, instead of the 900

to 1,200 C usually required for such cells. A solar collector may therefore be used as the heat source for regeneration, or low-grade industrial waste heat may be used, such as that from waste steam or from combustion gases. In the new concentration cell, both anode and cathode are made of aluminum, and the electrolyte is a complex of ethyl pyridium chloride solvent and aluminum chloride. At a predetermined ion-concentration difference between the two sides, the electrolytes are transported through conduits to a distillation column. There, aluminum chloride is boiled off by heat from a solar collector or other source and pumped to the cathode.

FOR ADDITIONAL INFORMATION: The patent document on which is available for \$1.00 from Commissioner of Patents, Washington, DC 20231. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

Solar-Assisted Solution-Mining Concept: Brine heated in a solar pond would dissolve minerals from deposits
See 0849

0383 Solar-Cell Encapsulation by One-Step Lamination: Prefabricated covers are brought together with interconnected solar cells and cured in a single step

National Aeronautics and Space Administration,
Washington, DC.

Aug 83 (C, G)

A simple method of potting solar cells reduces encapsulating the cells to a one-step lamination process. The simplified process should save time and expense. Several different materials can be used for the assembly components depending on which cover receives the adhesive that initially holds the solar cells. Among the choices for potting material are polyvinyl butyral, ethylene vinyl acetate copolymers, and ethylene propylene rubbers.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15222.

0384 Solar-Powered Turbogenerator: Proposed all-weather system assures uninterrupted electric-power supply

Department of Energy, Washington, DC.

Sep 83 (C, D)

A recently proposed turbogenerator utilizes submicron particles to convert solar energy into heat for electric-power generation. The particles are dispersed throughout the compressed intake gas. They distribute the heat evenly and efficiently without the need for heat-absorbing coatings or intricate conduit networks. In the process of heating the intake gas, the particles vaporize, imposing no hazard to the turbine blades. The turbogenerator operates on an open Brayton cycle; closed Brayton cycle or other thermodynamic cycles can also be used.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: LBL-9317, price code: A02. The patent document on which this technical note is based is U.S. Patent 4,313,304, which is available from: Commissioner of Patents, Washington, DC 20231, Washington, DC 20231 for \$1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. DOE, Washington, DC 20585.

0385 Stable Stratification for Solar Ponds: A disodium phosphate brine forms density layers spontaneously and reforms them after a disturbance

National Aeronautics and Space Administration,
Washington, DC.

Feb 83 (C, J)

Laboratory experiments have shown that a stable density gradient forms in a pond saturated with disodium phosphate (DSP). DSP increases in solubility with temperature, as does the density of the DSP solution. A Volume of DSP-saturated water therefore tends to develop temperature and density layers. Since tests indicate that the thermal and density gradients remain in equilibrium at heat removal rates of 60 percent or more of the heat input rate, a pond containing DSP would be suitable for collecting solar energy and transferring it to a heat exchanger for practical use.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div., P.O. Box 8757, BWI Airport, MD 21240. Refer to NPO-15439/TN.

0386 Steam Drying of Lignite: Review evaluates various steam-drying processes for high-moisture coals

Department of Energy, Washington, DC.

Mar 83 (D)

A recent review of steam-drying technology for lignite coals has examined all the key parameters that control coal drying and has analyzed the characteristics of proposed and commercially-used steam-drying processes. Steam drying considered more efficient for lignites than evaporative drying, if energy recovery is practiced. The examined processes include Fleissner drying, Davy Pacific, Koppelman, and single-vessel steam drying. These are compared with evaporative drying.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-007849, price code: A03 or for information not in the report contact Leland E. Paulson, U.S. DOE, Grand Forks Energy Technology Center, P.O. Box 8213, University Station, Grand Forks, ND 58202; (701) 795-8165.

0387 Storing Winter Ice for Summer Air-Conditioning: This system uses no external energy source to make and store ice

Department of Energy, Washington, DC.

Jul 83 (C, D)

A passive system stores the cold water and ice made in winter in a tank for use in summer air-conditioning. As compared with conventional, or active, systems that require energy to produce ice or cold water, this system needs no energy input, as it has no pumps, valves, or sensors. Instead, a heat pipe, partially filled with a low-boiling-point fluid (e.g., ammonia), cools the tank water without the need of an external energy source.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,271,681, which is available from: Commissioner of Patents Washington, DC 20231 for \$1.00. For licensing information, contact: Office of Assistant General Counsel for Patents, US DOE, Washington, DC 20585.

0388 Striped Electrodes for Solid-Electrolyte Cells: Gas flows freely between contact stripes

National Aeronautics and Space Administration,
Washington, DC.

Aug 83 (B, J)

Striped electrodes have been tested as a way of improving solid-electrolyte cell performance. The spaces between the contact stripes facilitate the flow of gases into and out of the electrolyte. The electrodes are made of platinum that is deposited as a thick film of ink or paste on the electrolyte surface and then fired. Typical solid electrolytes include sintered stabilized zirconia, doped alumina, or other ion conductors. In cells with striped electrodes, the platinum is too thick to be porous. However, the spaces between the contact stripes remove the barrier to gas flow across the electrolyte/atmosphere interface.

FOR ADDITIONAL INFORMATION: For licensing opportunity or other information, contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15269.

Study of Materials to Resist Corrosion in Condensing Gas-Fired Furnaces

See 0760

0389 Synthesis Natural-Gas Demonstration Project: Pipeline-quality gas would be manufactured from coal, water, and air

Department of Energy, Washington, DC.

Jan 83 (C, D)

A proposed demonstration plant has been designed to manufacture daily up to 19 million standard cubic feet of synthesis natural gas from a daily input of 1,256 tons of Ohio No. 9 coal or other eastern bituminous coals. The project entails only moderate technical risk since most of the required technology is already well established. It is based on a slagging gasifier and a catalytic shift/methanation unit.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DOE/ET/13060-T1, price code: A03 or for information not provided, contact Robert A. Verner, US DOE, FE-45, Room F-310, Washington, DC 20545; (301) 353-5988.

System To Prepare Solar Cells for Assembly: To reduce labor, an industrial robot is used for solar-cell positioning and soldering operations

See 0638

0390 Tests of Prototype Lithium/Thionyl Chloride Cells: High-rate cells can be safely short-circuited and reversed

Army Materiel Development and Readiness Command,
Alexandria, VA.

Aug 83 (C)

Safe, high-performance Li/SOCl₂ cells have been successfully demonstrated, according to a progress report prepared for the U.S. Army Electronics Research and Development Command. Two types of cells have been under development: spirally wound D-cells and flat cylindrical cells of 3-in. (7.6-cm) diameter and 0.9-in. (2.3-cm) thickness. During the reporting period, the D-cell design was further refined by increasing the cathode capacity while maintaining a large electrode area to combine high-charge capacity with high-discharge-rate capability.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A085661, price code: A04 or contact project officer N. Hamilton (201) 544-4258.

0391 Thermal-Energy Storage Systems for Solar Plants: A conceptual design of a thermal-energy storage system for a 100-MWe solar plant offers cost/performance advantages over the oil/rock thermocline concept

Department of Energy, Washington, DC.

Jul 83 (C, D)

Three conceptual thermal-energy storage systems have been analyzed for cost/performance advantages over the oil/rock thermocline energy-storage system that is currently being installed at the central-solar-receiver 10-MWe pilot plant under construction in Barstow, California. The analysis was carried out for a 100-MWe solar-central-receiver plant. The moving-sand-bed energy-storage system was selected as the most practical alternative. Its round-trip efficiency was about 12 percent higher than that of the air/rock concept, and it had slightly lower capital and operating costs than the molten-salt concept.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE81-024263, price code: A10.

Toxicology of High Energy Synthetic Fuels

See 0814

Toxicology of Hydrazine Type Fuels

See 0815

0392 Transparent Solar-Energy Assembly: Economical space-heating assembly collects solar heat and admits light into the house

Department of Energy, Washington, DC.

Apr 83 (C, D)

A recently-developed passive solar-energy assembly is semitransparent to sunlight. As it collects the solar energy to heat the house, it also admits light into the room and does not block the outdoor view. An additional feature is modular design. The assembly can be readily retrofitted to existing buildings. Structured as a rectangular frame the assembly has two clear glass walls sealed to the frame. Between these two walls is a semitransparent thermalization plate that converts the incident solar energy to thermal energy. Water on both sides of this plate acts as a heat-storage medium.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,286,576, available from: Commissioner of Patents, Washington, DC 20231. Remit \$1.00. For technical information, contact: J. F. McClelland, Ames Laboratory USDOE, Iowa State University, Ames, Iowa 50011; (515) 294-4922.

Transportation Energy Data: A basic reference book contains voluminous data on energy consumption

See 0927

0393 An Update on Coal-Fired Stoked Boilers: Study examines emissions and efficiencies of these industrial boilers

Department of Energy, Washington, DC.

Apr 83 (C, D)

A study presents specification data of industrial coal-fired boilers. The data are the result of an extensive test program involving 400 tests on 18 boilers grouped into 36 boiler/coal combinations. Major stoker classifications reviewed by this work include spreader, mass-fired overfeed, and underfeed stokers. In this program, boiler emissions and efficiencies were measured under a variety of operating conditions.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE81-030442, price code: A04.

Using Office Waste as Fuel: Densified refuse-derived fuel would be burned in boilers

See 0423

0394 Utility-Controlled Customer-Side Thermal Energy

Storage Tests: Heat Storage

Oak Ridge National Lab., TN.

Jan 83 (C)

Customer-side thermal energy storage provides a method for storing electric energy (such as heat) in the end-use form. This is an option for electric-load management because the electric utility can tailor the electric-load demand of residential customers by controlling when the storage systems use electric energy to store heat. By controlling the storage system (so they charge with off-peak energy), the utility can reduce the peak electric demand, increase the electric system load factor and improve system efficiency, and delay the requirement for additional generation facilities. At the same time, the customer is able to utilize the stored energy for space heating or water heating without changing his life-style. Four types of heat storage systems were tested: ceramic brick, concrete slab, heat pump with storage, and pressurized hot water storage. The results of these tests should be used by electric utilities considering residential heat storage systems as an electric-load management option.

FOR ADDITIONAL INFORMATION: Contact: D.W. Jared, Oak Ridge National Lab., P.O. Box X, Oak Ridge, Tennessee 37830; (615) 574-4192. Request support package 439/X/TN.

Viscosity Depressants for Coal Liquefaction: Certain unsaturated hydrocarbons would prevent coal from solidifying during liquefaction

See 0128

Wind-Powered Pumping for Low-Lift Irrigation: System effectively performs low-lift irrigation to conserve energy and water

See 0048

0395 Wrapping Electric Water Heaters With Insulation: A thermal insulation blanket can safely reduce energy costs if water temperature is limited to 140F

Department of Energy, Washington, DC.

Jul 83 (C)

Thermal insulation blankets wrapped around electric water heaters can be effective energy savers if the users abide by certain safety rules. The major concern is in covering up the service-wire entry-box covers. These covers are best left open to air circulation. If they are covered, the electrical service conductors can overheat and start a fire. This conclusion is the result of a study performed on electric water heaters that were wrapped with thermal insulation in three different ways: (1) completely wrapped; (2) wrapped with

cutout to leave the entry-box covers open to air; (3) partially wrapped to leave, in addition to the open entry-box covers, thermostat access plates open to air.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-012580, price code: A02 or for information not in the report, contact C. Douglas Auborg, PE, Bonneville Power Administration, P.O. Box 3621, M.S. EPC, Portland, OR 97208; (503) 230-3468.

ENVIRONMENTAL POLLUTION & CONTROL

Acoustic Ground-Impedance Meter: Portable device is based on the Helmholtz-resonator principle

See 0424

Airborne Detector for Acidic Sulfates: Impactor instrument samples fine-particle aerosols at altitudes from 300 m to 4 km

See 0427

Antenna Field-Display Technique

See 0228

0396 Ash Removal System for Fluidized-Bed Reactors:

Solid products from a coal gasifier are removed through a temperature-controlled valve, which responds to ash accumulation

Department of Energy, Washington, DC.

Oct 83 (D)

The automatic, controlled removal of ash and char from coal-gasification reactors is accomplished by injecting a cool stream of gas into the bottom of the vessel, creating a thermal interface region between the cool gas and the fluidizing gases of the reactor, monitoring the interface region as it rises with ash accumulation, and opening a valve to remove the ash when the interface region reaches a predetermined level. This system is an improvement over conventional techniques, which either required constraints on operational parameters or were unable to monitor adequately ash buildup.

FOR ADDITIONAL INFORMATION: The patent on which this technical note is based is U.S. Patent 4,309,194 which is available from Commissioner of Patents, Washington DC 20231 for \$1. For licensing information, contact Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

Biological Detector and Warning System: The system, consisting of an alarm and a sampler, could prove useful in atmospheric-pollution studies

See 0431

Biological Hazards of NMMW Radiation: Publication surveys the hazards of the 100-to 1,000-GHz radiation

See 0775

0397 Biomethanation of Pyrolysis Gas: Biomethanation should be less expensive than catalytic methanation

Department of Energy, Washington, DC.

Apr 83 (C, D, G)

An engineering and economic analysis has recently been done for the biomethanation of pyrolysis gas produced from municipal solid wastes. This gas is suitable for conversion to pipeline-grade synthetic natural gas (SNG). Biomethanation promises several advantages over catalytic methana-

tion, including adaptability to any mixture of pyrolysis gases, insensitivity to poisoning by sulfur compounds, simplified gas cleanup, ability to utilize nitrogen contaminants, the utilization of reaction heat to form cell mass, and minimal water use.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE81-025849, price code: A11 or for information not provided in the report, contact: Donald K. Walter, US DOE, U.S. Department of Energy, CE-323, 1000 Independence Ave., Washington, DC 20585; (202)252-1697.

Can-Filled Crash Barrier: Inexpensive materials and simple construction protect motorists at low and moderate speeds

See 0914

0398 Carbon Filters for Potable Water: Filter removes hydrocarbon taste and odor

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (D)

A carbon filter was evaluated for improving the palatability of potable water contaminated with diesel fuel. The study was conducted for the U.S. Army Mobility Equipment Research and Development Command. A suitable filter was required to remove the taste and odor due to trace amounts of residual fuel in tankers converted from petroleum to potable-water service by a detergent and steam-cleaning process.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A107878, price code: A02 or contact project officer Elizabeth Radoski (703)664-6041.

0399 Characterization of U.S. Cement Kiln Dust

Department of the Interior, Washington, DC.

Aug 83 (J)

Cement kiln dust (CKD) is a waste product generated at the rate of 4 to 12 million tons per year in the United States. The dust has considerable resource potential as a neutralizer for coal mine waste effluents and as a lime substitute in the agriculture and construction industries. However, little information has been published on the composition and characteristics of CKD, and a concern arose over the potential environmental effects of the waste. To assess the hazardous waste potential of CKD samples submitted by 102 plants (representing over 70% of the U.S. cement industry) were characterized.

FOR ADDITIONAL INFORMATION: A Bureau of Mines Information Circular (IC) 8885 is available. Contact: Benjamin W. Haynes, Bureau of Mines, Avondale Research Center, 4900 Lasalle Road, Avondale, MD 20782; (301)436-7564.

0400 Co-Gasification of Densified Sludge and Solid Waste in a Downdraft Gasifier

Environmental Protection Agency, Washington, DC.

Jan 83 (D)

Thermal gasification is a new process for the co-disposal of densified sludge and solid waste in a co-current flow, fixed bed reactor (also called a downdraft gasifier). The advantages of this technology include lower costs than other incineration or pyrolysis technologies, simple construction and operation, and the ability to use a variety of fuels in-

cluding agricultural wastes and other biomass materials in addition to densified sludge and solid waste.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB82-230293, or contact Howard Wale, US EPA Municipal Environmental Research Laboratory, Cincinnati, OH 45268.

A Computerized Water Management Tool: The instream flow incremental methodology

See 0130

0401 Concentrating Trace Organics From Water: A new analytical technique is rapid, reproducible, and efficient

Army Materiel Development and Readiness Command, Alexandria, VA.

Jan 83 (D, J)

In experiments at the U.S. Army Natick Research and Development Laboratories, a convenient new method for the concentration of trace quantities of organic compounds from water was demonstrated. The primary utility of the method lies in the study of soil and water contamination from the biodegradation products of 2,4,6 trinitrotoluene (TNT). The method may also prove useful with other organic compounds. A 300-ml dilute aqueous solution of each compound (at concentrations ranging down to 1 part per billion (ppb)) was drawn through a special cartridge (SEP-PAK, or equivalent). The compound collected in each cartridge was eluted with 5 ml of methanol, concentrated down to 0.5 ml, and analyzed by high-performance liquid chromatography. In general, the method is rapid, reproducible, efficient, and requires less solvent and sample handling than do other methods.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A101639, price code: A02 or contact Project officer A.M. Kaplan (617) 633-5526.

Continuous Monitoring of Aerosols: Online spectrometer monitors the composition of individual aerosol particles

See 0436

0402 Control of Acid Mine Drainage Using Surfactants

Department of the Interior, Washington, DC.

May 83 (D)

A method was developed to reduce acid mine drainage from coal refuse piles and surface mines by inhibiting the growth of acid-causing bacteria. A dilute surfactant or detergent solution is applied directly to coal refuse piles or overburden using a hydroseeder or road watering truck. The surfactant treatment can be used either as a preventive measure to avoid a potential acid drainage at its source. Acid drainage is prevented or reduced by inhibiting the growth of *Thiobacillus ferrooxidans*. The surfactant breaks down the bacteria's protective membrane which enables it to survive in acid environments.

FOR ADDITIONAL INFORMATION: Contact: Robert L.P. Kleinmann, Bureau of Mines Pittsburgh Research Center, P.O. Box 18070, Pittsburgh, PA 15236; (412) 675-6555.

Cyanide-Free Electroplating Process: Alternative electroplating solutions provide cyanide pollution abatement

See 0542

0403 Development of a Tunable Zeeman Spectrometer for Analysis of Toxic Organic Compounds

Environmental Protection Agency, Washington, DC.

May 83 (E, J, K)

Increased utilization of advanced technologies has led to the need to monitor a large variety of toxic organic and inorganic species. An analytical technique called Tunable Atomic Line Molecular Spectroscopy (TALMS) has recently been developed at the Lawrence Berkeley Laboratory. The selectivity of TALMS is such that molecules can be identified and quantified even in the presence of a large amount and number of interfering substances. This technique also requires minimal sample handling. TALM spectroscopy consists of splitting a source atomic emission spectral line by means of a magnetic field (Zeeman effect) and making a differential absorption measurement between one Zeeman component that has been magnetically tuned to match an analyte absorption line and an unmatched Zeeman reference component. One remarkable feature of TALMS is its essential freedom from background interference.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: Pb83-139535, price code: AO4 or contact D.R. Scott, Environmental Monitoring Systems Laboratory, US EPA, Research Triangle Park, NC 27711.

Development of a Carcinogen Assay System Utilizing Estuarine Fishes

See 0779

Dredging and Dredged Material Disposal

See 0133

0404 Dust Control Hood for Bag-Filling Machines

Department of the Interior, Washington, DC.

Sep 83 (D)

It was desired to reduce worker exposure to respirable dust without interfering with bag-filling operations. A dust control hood was developed which contains and captures dust close to its source and prevents it from entering the bag-filling operator's work place. A sheet metal hood is placed around the nozzle of the bag filling machine. The hood is connected through ducts to the plant exhaust ventilation system. Air pulled into the front of the hood and around the sides of the bag picks up dust generated inside the hood, and carries it to the dust collector. The size of the hood can be adapted to fit most fluidized valve-type bag-filling machines.

FOR ADDITIONAL INFORMATION: Contact: Jon C. Volkwein, Bureau of Mines Pittsburgh Research Center, P.O. Box 18070, Pittsburgh, PA 15236; (412) 675-6689.

0405 Electrostatic Augmentation of Fabric Filtration: Pulse-jet pilot unit experience

Environmental Protection Agency, Washington, DC.

Aug 83 (D)

The use of fabric filters to remove particles from gas streams, well established in industrial practice, is of growing importance in electrical utility applications. Their major drawback in coal-fired applications has been unexpectedly high pressure drops at some installations. Research indicates that both reduced residual pressure drop and reduced dust cake flow resistance can be achieved in electrostatically enhanced fabric filtration (ESFF). Research has been conducted to evaluate the concept of ESFF, as devel-

oped in the laboratory, on particulate in a slipstream from an operating coal-fired boiler.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB83-168265, price code: A05 or contact Louis S. Hovis, Industrial Environmental Research Laboratory, U.S. EPA, Research Triangle Park, NC 27711.

0406 Encapsulation of Asbestos

Department of the Navy, Washington, DC.

Jul 83 (D)

Because airborne asbestos fibers create a health hazard, different methods for immobilizing old building insulation materials have been investigated. This effort addresses the encapsulation methods, which generally is the least expensive. Encapsulation is the application of a liquid material onto a friable insulation to lock the asbestos fibers into their existing insulation matrix and prevent them from being jarred loose and becoming airborne.

FOR ADDITIONAL INFORMATION: Contact: Mr. Ernest Lory, Code L52, Naval Civil Engineering Laboratory, Port Heuneme, CA 93043; (805) 982-5555. Refer to Tech data Sheet 83-10.

0407 Engineering Design Manual for Solid Waste Size Reduction Equipment

Environmental Protection Agency, Washington, DC.

Mar 83 (D)

A manual was developed to supply the solid waste industry with a state-of-the-art reference to size reduction information and methods. Emphasis is on design consideration for size reduction equipment, but information is also included on hardware specifications, selection, and testing; maintenance and safety; and economics. The manual is aimed at a diverse group, including public works and sanitation officials, equipment manufacturers, system designers, plant operator, and researchers. Fundamental concepts are thus included along with empirical data on solid waste size reduction. The design manual is aimed at individuals with varied connections to refuse processing and resource recovery, including public works and sanitation officials, equipment manufacturers, system designers, plant operators, and researchers.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB83-139493, price code: A08 or contact C.C. Wiles, Municipal Environmental Research Laboratory, U.S. Environmental Protection Agency, Cincinnati, OH 452568.

0408 Environmental Control for Industrial Boilers: Available and emerging technologies are assessed

Department of Energy, Washington, DC.

Nov 83 (D)

A study covered the current status of environmental-control technologies for industrial steam boilers that use coal, coal-derived fuels, and refined-fuel oils. Analyses of performance and costs are presented in light of environmental guidelines for pollution control. The report surveys the currently deployed flue-gas-desulfurization technologies with cost-benefit analyses.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by order-

ing the NTIS report, order number: DE82-019249, price code: A08.

Environmental Impact of High-Voltage Lines: New compact structures are introduced
See 0329

Enzyme Pollution Blodetection Systems: Development of a field instrument
See 0445

Equation for Combustion Noise: Mathematical expression relates noise to characteristics of the combustion process
See 0149

0409 Estimating Municipal Solid-Waste Generation: Residential solid-waste generation is related to household income, commercial solid-waste generation, to retail sales

Department of Energy, Washington, DC.

Jul 83 (D)

(1) A city or region is chosen; (2) The median household income in the chosen area is determined; (3) The per capita, daily solid-waste generation (PSWG) is calculated from median household income in thousands of dollars; and (4) The per capital solid-waste generation rate is multiplied by the total population of the area.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE81-024152, price code: A05 or information not provided in the report contact Donald K. Walter, US DOE, 1000 Independence Ave., CE-323, Washington, D.C. 20585.

0410 Flowthrough Water Chlorinator: Portable water-disinfection system is tested

Army Materiel Development and Readiness Command, Alexandria, VA.

Dec 83 (D)

Portable-water chlorinator unit has been evaluated for potential use with mobil water purification systems, such as reverse-osmosis water purifiers, for water disinfection. The study was conducted for the U.S. Army Mobility Equipment Research and Development Command. The chlorinator consists of a plastic mixing chamber with special chlorine-resistant seams and a polyethylene hopper and lid. The hopper holds calcium hypochlorite tablets, and can be twisted higher or lower into flow of water through the chamber to change the amount of exposure to the tablets and adjust the amount of exposure to the tablets and adjust the level of chlorination. Results indicated that the unit was able to maintain the level within ± 3.0 ppm.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A115797, price code: A02 or contact project office Cindy M. Shall (703) 664-2576.

Formaldehyde Surface Emission Monitor

See 0450

0411 Impactor for Monitoring Contaminant Particles in Air: Virtual impactor separates fine and coarse particles for more accurate air-pollution monitoring

Department of Energy, Washington, DC.

Jun 83 (K)

A proposed single-stage virtual impactor separates fine- and coarse-particulate contaminants in the atmosphere.

Such separations are necessary for environmental monitoring, since fine and coarse particulate matter arise from different sources and produce distinctly different physiological effects. The new impactor has several advantages as compared with the conventional particle impactors: Particle losses are minimized, and problems of particle bounce and reentrainment are eliminated. In the new impactor, high cutoff precision between particle size is possible. Uniform-particle deposition across the filters facilitates subsequent particle analyses by beta attenuation and X-ray fluorescence.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: LBL-8725, price code: A02 or for licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

0412 Measurement of Aerosol Carbon Content

Environmental Protection Agency, Washington, DC.

Mar 83 (J, K)

Ambient aerosols, particularly those with diameters of less than 3 microm are a serious pollution problem. Carbonaceous material is a major component of the fine particle concentration. The development of two techniques for total and elemental carbon analysis was studied. Both methods are totally instrumented, automated and nondestructive. Total carbon is determined using the gamma-ray analysis of light elements (GRALE) technique. This method involves the inbeam measurement of gamma rays emitted during the inelastic scattering of protons accelerated in a cyclotron. In the second method, elemental carbon is determined by a light reflectance method.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB82-249152, price code: A03.

Measuring Formaldehyde Concentration in Indoor Air: Impregnated filters and test atmospheres for calibration make monitoring possible at parts per billion

See 0462

Measuring Radon Levels Indoors: Techniques are suggested and study results are reported

See 0857

0413 Membranes Remove Metal Ions From Industrial Liquids: The low-cost membranes are simply suspended in metal-ion/liquid solutions to remove impurities

National Aeronautics and Space Administration, Washington, DC.

Oct 83 (D)

Disposing of contaminated liquids is an increasing problem in today's industrial society. Metal cations (positively charged atoms) are present as contaminants or impurities in many industrial liquids. Current systems employ cation-exchange resins as powders, beads, or granules for use in metal-removal filtration systems. In terms of energy requirements and capital equipment costs, however, these systems are not optimized. A method has been developed at Lewis Research Center that is a major improvement in metal-ion removal. This technique enables the cation-exchange resin to be fabricated into a more efficient form, that of a thin membrane film of various sizes. This removal system does not require pumping, filtration equipment, or

constant movement of the solution. The unique quality of these membrane films is that they are nonfouling and have outstanding high-absorption capacity. Possible applications of these membrane films include use in analytical chemistry for the determination of small amounts of toxic metallic impurities in lakes, streams, and municipal effluents. It is also possible that this type of ion-exchange membrane may be suitable for use as an absorber of certain pollutant gases and odor present in confined areas. These membrane films comprise a cross-linked copolymer of polyacrylic acid (the active ion exchanger) and polyvinyl alcohol (the antifouling agent).

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., PO Box 8757, BWI Airport, MD 21240; Refer to LEW-13853.

0414 Methane Enhancement in Landfills: Managing key parameters in landfills improves methane gas production

Department of Energy, Washington, DC.

Aug 83 (C, D)

Preliminary laboratory and field experiments have demonstrated that methane production can be substantially improved by optimizing conditions in the landfill. The most important parameters were found to be water content, alkalinity, nutrient supplementation, and bacterial seeding. Other factors that affect gas production include temperature, particle size, and density.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-000155, price code: A04. For information not provided in the report contact Michael L. Wilkey, P.E., Gas Research Institute, 8600 W. Bryn Mawr, Chicago, IL 60631; (312) 399-8321.

Mobile Air Sampler: Vehicle-mounted sampler gathers specimens along highways and in tunnels

See 0471

Modifying Exhaust Outlet Reduces Vehicle Operator Exposure to Diesel Exhaust

See 0842

0415 Monitoring Spent Geothermal Water: Instrumentation warns if geothermal fluids pollute groundwater after they returned to earth

Department of Energy, Washington, DC.

Oct 83 (D, K)

Monitoring the injection of spent geothermal fluids at reasonable cost can be greatly improved by multiple-completion techniques (those employing one or more instrumentation standpipes in the injection-well borehole), according to a report. Injection wells are a common feature in almost all geothermal production plants because of the need to dispose of spent fluids without releasing them to surface waters. Monitoring injection provides a warning of the potential impairment of groundwater. The report suggests three basic monitorwell types for the collection of pressure and temperature data: (1) single standpipe, (2) multiple standpipe, and (3) closed-system piezometers. A fourth type, a combined monitoring and injection well is not recommended. Although data on water quality are important, provisions for monitoring water quality greatly add to the cost of construction and are not covered in the report.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by order-

ing the NTIS report, order number: DE82-012770, price code: A04.

0416 MPTER-DS: The MPTER Model Including Deposition and Sedimentation User's Guide

Environmental Protection Agency, Washington, DC.

Nov 83 (D)

MPTER is the designation for a multiple point source air quality model with terrain adjustments. The diffusion algorithm is based upon Gaussian plume modeling assumptions. The MPTER model can be used for estimating air pollutant concentrations from multiple sources in rural environments. The model has technical input options for terrain adjustment, stick downwash, gradual plume rise, and buoyancy-induced dispersion, and a great variety of output options. The MPTER model, therefore, may be considered a research tool for exploratory use of various assumptions and parameter values.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB83-114207, price code: A05 or contact Jack H. Shreffler, Environmental Sciences Research Laboratory, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711.

New Machine-Mounted Dust Collector System for Continuous Mining Machines

See 0843

A New Use for High-Sulfur Coal: High-sulfur coal could be used without environmental liability

See 0360

NMMW Radiation Detector: Hot-electron photoconductive detection of NMMW radiation was observed in mercury/cadmium telluride single crystals

See 0859

0417 Noise-Dampening Structural Alloys: High-strength cobalt/iron alloys have vibration absorption properties for noise abatement

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (H)

A study of a series of cobalt/iron alloys has resulted in the development of structural materials that can dampen audible frequencies. The study was conducted for the U.S. Army Materials and Mechanics Research Center. Applications, for the new alloys include such diversified end uses as marine propellers, helicopter gears, mufflers and ducts on land vehicles and power saws, impact bits, and a variety of other components to dampen noisy equipment.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A107745, price code: A05.

Personal Dust Monitor

See 0480

Portable Magnetic-Field Meter Developed For Use in Industrial Applications

See 0483

0418 Preventing Petroleum and Hazardous Materials Spills: Guidelines promote safety and fuel conservation

Department of Energy, Washington, DC.

Apr 83 (C, D)

A manual provides guidelines on preventing spills during the transportation, transfer, storage, and processing of petroleum products. It furnishes data on the costs of the implementation of a spill-prevention program as aid in budgeting for acquiring and installing equipment. The sources of spills covered in the manual include bulk-storage tanks, secondary containment systems (such as diked areas and buried tanks and line), tank-truck and tank-car loading racks, loading and unloading piers, and wastewater-treatment ponds. For each source the manual offers some suggested remedies. The manual describes the characteristics and costs of eight spill-detection systems. Finally the manual provides guidance on establishing plant security.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE81-026036, price code: A15 or for information not provided in the report, contact: Dr. John Cece, U.S. DOE, U.S. Department of Energy, EP-323, Washington, DC 20545; (301)353-5486.

Producing Cryolite From Waste Sodium Fluoride: Use of waste NaF could improve the economics of silicon production

See 0117

0419 Pure Nitrogen From Diesel Exhaust: Gas can be used for corrosion-free drilling

Department of Energy, Washington, DC.

Nov 83 (D)

A trailer-mounted system supplies 2,000 stdftcu/min of dry, essentially pure nitrogen from diesel exhaust. The nitrogen used in gas drilling operations reduces drill-pipe corrosion, a common problem in drilling geothermal wells. The system is operable in the field and may be transported over highways. The diesel engines that supply power for normal drilling rig operations supply the exhaust gas to be purified. The system requires no water and operates at ambient temperatures of up to 110F and is therefore well suited for use in a desert.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-019808, price code: A04. For information not in the report, contact James R. Kelsey, Sandia National Laboratories, Division 9741, Albuquerque, NM 87185; (505)844-6968.

0420 Recycling Limestone for SO₂ Absorption: Pollutant-absorbing material is utilized more efficiently

Department of Energy, Washington, DC.

Dec 83 (D, J)

Partially reacted limestone used for removing sulfur dioxide during the fluidized combustion of coal can be reactivated by hydration. This increased utilization would reduce material costs and minimize the environmental impact of the quarrying and disposing of large amounts of limestone. Unreacted limestone introduced into a fluidized-bed coal combustor undergoes simultaneously calcination and sulfation. The combined reactions produce limestone particles with a calcium sulfate layer surrounding an interior of calcium oxide. As the limestone particles overflow from the combustor, they are soaked with water, and calcium hydroxide forms in the interior. Because the interior expands, the calcium sulfate surface cracks, yet the particles retain their integrity. The hydrated material is then reintroduced into the combustor where dehydration and further sulfation occur simultaneously.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-019236, price code: A03.

0421 Refuse/Oil Fuels for Industrial Boilers: Technology is available for producing such fuels

Department of Energy, Washington, DC.

Apr 83 (C)

Commercially available grinding equipment was successfully demonstrated in processing refuse for homogenated fuel. This fuel, a mixture of municipal solid wastes and No. 6 fuel oil, called 'refoil', holds promise as an economical alternative to pure fuel oil designated for industrial boilers. A successful development of this technology may divert more than 90 percent of the 135 million tons of municipal solid waste generated annually in the United States to refuse-derived fuel (RDG).

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-011848, price code: A03 or for information not provided contact Donald K. Walter, USDOE, CE-323, 1000 Independence Avenue, SW., Washington, DC 20585; (202)252-1697.

Removing Nitrogen and Sulfur From Carbonaceous Liquids: Catalysts can make these liquids suitable as boiler fuels or as refinery feedstock

See 0121

Retrofit Noise Control Techniques for Crushing and Screening Plants

See 0846

Revegetating Coal Refuse: Even a shallow soil cover greatly aids the growth of vegetation

See 0847

Toxicokinetics of Inhaled Gases

See 0813

Toxicology of High Energy Synthetic Fuels

See 0814

Toxicology of Hydrazine Type Fuels

See 0815

Unique Chemical Gas Sensors, No Bigger Than a Pen

See 0501

0422 User's Guide for the Automated Inhalation Exposure Methodology (IEM)

Environmental Protection Agency, Washington, DC.

Dec 83 (D, E)

The Inhalation Exposure Methodology (IEM) is a system of computer programs used to estimate atmospheric transport of, and population exposure to, airborne pollutants. IEM was developed to provide automatic access to population and meteorological data employed in a sophisticated but user-friendly atmospheric dispersion modeling methodology. Although results of IEM can be applied to a number of different problems, its principle use is estimating air pollution concentrations and human inhalation exposures in the vicinity of hazardous waste incineration facilities. IEM has been particularly effective in comparing different pollution control techniques and the relative importance of several sources of facility emissions.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB83-187468, price

code: A06. The EPA Project Office, B.L. Blaney, can be contacted at Industrial Environmental Research Laboratory, U.S. Environmental Protection Agency, Cincinnati, OH 45268.

0423 Using Office Waste as Fuel: Densified refuse-derived fuel would be burned in boilers

Department of Energy, Washington, DC.

Mar 83 (C)

A plan has been outlined for the conversion of some Government office waste to fuel. According to the proposal, waste would be converted to densified refuse-derived fuel (d-RDF). Test burns using d-RDF as a supplementary fuel were conducted. Observations were also made of waste compaction, processing densification, storage, and related economics. Operations with various proportion of d-RDF showed no extraordinary difficulties, though some question remain concerning increased emissions of particulate lead and hydrogen chloride gas.

FOR ADDITIONAL INFORMATION: Contact: Donald K. Walter, U.S. DOE, C.E.-32, 1000 Independence Avenue, S.W., Washington DC 20585; (202) 252-1697.

INSTRUMENTATION & TESTING

Accelerated Corrosion Test for Antifreeze Compounds: Suitability of compounds is determined with minimum time and expense

See 0087

0424 Acoustic Ground-Impedance Meter: Portable device is based on the Helmholtz-resonator principle

National Aeronautics and Space Administration, Washington, DC.

Dec 83 (J, K)

A Helmholtz resonator is used in a compact, portable meter that measures the acoustic impedance of the ground or other surfaces. The Earth's surface is the subject of increasing acoustical investigations because of its importance in aircraft noise prediction and measurement. The acoustic ground-impedance meter offers several advantages over others. It is compact and portable and can be set up at any test site, irrespective of landscape features, weather, or other environmental conditions. Its speed of operation makes it well suited for use in conjunction with other acoustic measurements, such as aircraft noise measurements; and its operation is simple.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: NASA-TM-83227, price code: . For inquiries concerning licensing opportunities, contact Howard J. Osborn, Langley Research Center, Mail Code 279, Hampton, VA 23665. (804) 827-3725.

0425 Acoustic Instrumentation for Coal-Conversion Plants: Acoustic instruments are nonintrusive and respond rapidly

Department of Energy, Washington, DC.

Mar 83 (C, D, K)

A report discusses advances in process control instrumentation for coal-conversion plants, with emphasis on acoustic techniques. The use of such nonintrusive techniques is dictated by the abrasive and corrosive nature of solid-laden liquid or gaseous process streams with temperatures exceeding 2,000 F and pressures up to 4,500 psi. Flow velocity can be measured with a Doppler technique. A passive

acoustic listening device has been tested for use as a flow/no-flow safety monitor for the char stream of a commercial gasifier. Acoustic means have also been proposed for the determination of temperatures, levels, and viscosities.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order numbers: ANL/FE-49628-TM04 and ANL-79-62; price codes: A07 and A23 or contact A. C. Raptis, Argonne National Laboratory, Component Technology Div., Argonne, IL 60439.

0426 Advanced Testing of Electro-optic Components: Recent and proposed developments in testing optics are described

Army Materiel Development and Readiness Command, Alexandria, VA.

Jan 83 (B, K)

A review of the field of testing optical components is presented in a report of the U.S. Army Missile Command. Emphasis is upon test techniques applicable to aspherical diamond-turned reflectors. Although the primary purpose of the study was to develop recommendations for Government initiatives to promote needed advances in testing, the text and reference material are useful to manufacturers of electro-optic components concerned with cost-effective production. The study includes a poll of experts and a bibliography on optical testing methods. A new approach for the generation of these holograms has been proposed.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A101 036, price code: A05 or contact project officer H. J. Caulfield, (205) 876-1607.

0427 Airborne Detector for Acidic Sulfates: Impactor Instrument samples fine-particle aerosols at altitudes from 300 m to 4 km

Department of Energy, Washington, DC.

Jul 83 (J, K)

An instrument called an attenuated total internal reflection (ATR) impactor is used aboard an airplane to measure the acidity of atmospheric aerosols. The instrument combines the collection of an aerosol by inertial impaction with subsequent spectroscopic analysis by the highly-sensitive ATR technique. The instrument provides a measurement sensitivity much greater (six times greater or sulfate ion) than that obtainable by earlier methods. It collects size- and the time-resolved samples and is potentially capable of automated real-time aerosol analysis.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE81-024481, price code: A03.

0428 Automatic Flushing Unit With Cleanliness Monitor: Particle content of flushing solution is measured continuously

National Aeronautics and Space Administration, Washington, DC.

Feb 83 (D, G)

A liquid-level probe is kept clean - and therefore at peak accuracy - by a unit that flushes the probe with a solvent, monitors the effluent for contamination, and determines when the probe is particle-free. Originally developed for probes on propellant tanks in the Space Shuttle, the approach may also be adaptable to industrial cleaning. Possi-

ble applications are in flushing filters and pipes and ensuring that manufactured parts have been adequately cleaned. FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and a diagram is available by ordering the monthly subscription package, order number PB83-925402, price code E02.

0429 Automatic Measurement of Crystal Angles: Prototype system promises to reduce the cost of producing crystal resonators

Army Materiel Development and Readiness Command, Alexandria, VA.

Oct 83 (J, K)

A prototype automatic X-ray orientation system (AXROS) has been developed to measure the angles of cut of doubly-rotated (SC) quartz crystals to an accuracy of seconds of arc at a production rate of one crystal/min. Conventional measurements of such angles require customized handling of each crystal, making the production more costly. The system incorporates the Laue diffraction method, which requires simpler diffractometer geometry and allows greater ease of automation than the conventional monochromatic techniques of locating the reflections.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A104945, price code: A04.

0430 Biaxial Shock Test Machine

Department of the Army, Washington, DC.

May 83 (D, H, K)

The Biaxial Shock Test Machine (BSTM) can test structures, models, and equipment in individually controlled horizontal and vertical directions simultaneously over a broad frequency band (4-200 Hz). This frequency range makes it possible to assure that appropriate sealing of the impulse, duration and frequency response is maintained when testing scale models. Earthquakes, blasts and transportation displacements, for example, can be simulated, as well as log-sweeps and resonant searches. Items weighing as much as 20 tons have been tested successfully on the BSTM's 12' x 12' platform using log-sweep techniques. Equipment tested includes a 300-kilowatt gas-turbine electric generator set, liquid cooling systems, motor control centers, power transformers, air handling devices, a 3-inch naval gun mount and a satellite communications ground station.

FOR ADDITIONAL INFORMATION: Access to the BSTM is available in some instances. Contact Dr. Walter Fisher, Construction Engineering Research Laboratory, P.O. Box 4005, Champaign, IL 61820; (217) 373-7248.

0431 Biological Detector and Warning System: The system, consisting of an alarm and a sampler, could prove useful in atmospheric-pollution studies

Army Materiel Development and Readiness Command, Alexandria, VA.

May 83 (E, J, K)

A biological detector and warning system (BDWS) capable of detecting the presence of biological aerosols and of collecting samples of these aerosols for subsequent analysis has been developed. The detection principle employed in the BDWS is the chemiluminescence resulting from the oxidation of luminol (5-amino-2,3-dihydroxy, 4-phthalazinedione) in alkaline solution. The overall function of the BDWS is to

transfer continuously aerosol particles from the atmosphere into a minimum volume of liquid. Periodically, the liquid sample is reacted with luminol and the resulting light emission analyzed to determine if biological agents are present. Because the sampler collects concentrated samples of particulates, it could prove useful in atmospheric-pollution studies. The system can be field operated with a minimum skill.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A090364, price code: A02.

0432 Capillary Flowmeter/Controller: Output flow is maintained despite changes in pressure

Army Materiel Development and Readiness Command, Alexandria, VA.

Aug 83 (D, K)

A meter/controller for small gas flows gives a nearly-constant output flow over a range of output pressures and can be set to different flow rates of the order of several liters per minute. The controller, built for the U.S. Army Armament Research and Development Command, operates from a gas supply of 200 psig and delivers the gas in a controlled flow at 0 to 1 atm absolute output pressure.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A083874, price code: A02, or contact project officer Mark A. Dewilde (301) 278-3677.

0433 Characterizing Fracture Topographies: Scanning electron microscope (SEM) is an indispensable tool for the positive identification of fracture modes

Army Materiel Development and Readiness Command, Alexandria, VA.

Apr 83 (H, K)

In experiments conducted by the U.S. Army Test and Evaluation Command, a scanning electron microscope was used to identify fracture characteristics on two broken barrel-support jackets for the M2 machine gun. The advantages of using the SEM in analyzing fatigue failures were demonstrated. The SEM with its resolution of 10 nm was used together with optical microscopy.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A090412, price code: A02.

Coefficient of Performance (COP) Meter For Installed Heat Pumps

See 0320

0434 Composite Fiber/Matrix Stability Measurement Using Ultrasound

National Bureau of Standards, Washington, DC.

Jan 83 (C, H, K)

A new invention uses ultra-sound to determine and measure stiffness degradation of fiber/matrix composite structures. It has been discovered that changes in the elastic stiffness properties of fiber/matrix composite structures can be measured by propagating energy flux stress waves through the composite material, and then measuring changes in the angle of the flux as an indication of elastic stiffness degradation. However, it must be understood that the technique is substantially only applicable to specific forms of fiber/matrix composites, primarily to those com-

posites in which the matrix or binder material is isotropic and in which the fibers within the matrix are unidirectional. FOR ADDITIONAL INFORMATION: Contact: Office of Government Inventions and Patents, National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161; (703) 487-4732. Refer to PAT-APPL-6,400,571.

0435 A Computer Program Has Been Developed For Gage Block Calibrations

Department of Commerce, Washington, DC.

Aug 83 (A, D, F)

The program provides a measurement assurance procedure for calibrating gage blocks. It assumes a standard measurement procedure in which a test set of gage blocks is measured against two standard laboratory calibrating sets with control on the difference between the standards. The program handles the statistical techniques to initialize the process parameters, maintain process control (using a check standard), and periodically update the process parameters. The code was developed in FORTRAN 77 for a UNIVAC 1100/82 system and runs to approximately 4050 lines.

FOR ADDITIONAL INFORMATION: A description of the program is contained in Computer Software for Measurement Assurance of Gage Blocks (TN 1168), available from the U.S. Government Printing Office, Washington, D.C. 20402, stock no. 003-003-02426-1, for \$4.75. Printed copies of the program or a recording of the program on magnetic tape are available from NBS. Contact Mrs. Ruth Varner, A341 Physics, National Bureau of Standards, Washington, D.C. 20234; (301) 921-2806.

0436 Continuous Monitoring of Aerosols: Online spectrometer monitors the composition of individual aerosol particles

National Aeronautics and Space Administration, Washington, DC.

May 83 (J, K)

A new system realizes a much-needed technique of pollution measurement- the continuous monitoring of aerosols in 'real time' Single aerosol particles up to about 5 microns in diameter are analyzed for their chemical composition, yielding valuable information on the nature of the pollution source. Tests show that the system has promise for monitoring the oxidation of sulfur dioxide to sulfates, which is important in controlling pollution from coal-fired powerplants. The new system has two major components: (1) a collimator, where the aerosol particles are channeled into a narrow beam and (2) a mass spectrometer. Inquiries concerning rights for the commercial use of this invention are desired.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Division, P.O. Box 8757, BWI Airport, MD 21240. Refer to NPO-15292.

0437 Detect Wear of Engine Parts and Cracks in Metal

Department of Commerce, Washington, DC.

Oct 83 (D, H, K)

Two new Standard Reference Materials (SRMs) have been developed by NBS for use in predicting the failure of metal parts in engines. SRM 1984, Wear-Metal in Oil (100 ppm), and SRM 1085, Wear-Metal in Oil (300 ppm), are for evaluating analytical methods in determining the concentrations of metals in lubricating oils. Predicting the failure of metal parts is critical to the economical maintenance of diesel and other piston type engines. SRM 1850, Penetrant Test

Block, a nondestructive evaluation reference material, is for checking the performance of liquid dye penetrants and dye penetrant crack detection systems for surface defect detection in metals. This SRM is being considered for use in Federal Aviation Administration guidelines.

FOR ADDITIONAL INFORMATION: All these SRMs are available from the Office of Standard Reference Materials, B311 Chemistry Building, National Bureau of Standards, Washington, D.C. 20234; (301) 921-2045.

0438 Detecting Flaws In Welded Plates by Acoustic Emission: The technique offers a method of in-process correction of welding parameters

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 (G, K)

Acoustic emission as a monitoring technique in armorplate welding is discussed in a report prepared for the U.S. Army Tank-Automotive Research and Development Command. Welding procedures, data-collection methods, and instrumentation are described. Acoustic emission is shown to be a viable tool for detecting, locating, and characterizing weld flaws in production welding on heavy armored vehicles. The in-process acoustic-emission technique used in the study will be invaluable to production armorplate welding since it can provide indications of flaw formation at the time of occurrence.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A085518, price code: A04 or contact project office Chester T. Kedzior (313) 574-6378.

Development of a Tunable Zeeman Spectrometer for Analysis of Toxic Organic Compounds

See 0403

0439 A Device for Vacuum Degassing Small Volume Water Flows

Department of the Interior, Washington, DC.

Oct 83 (D)

A device has been developed to remove supersaturated dissolved gas from small volume, flowing water supplies. It uses the principal vacuum degassing and is capable of reducing 150% total gas to 98% total gas for 55 gpm flows. A vacuum of only 1.5 inches of mercury is required. The total degassing capability of the device has been determined. The degasser is applicable to all situations where small flows are feeding aquaculture rearing units. It is so inexpensive that several systems could handle large volumes. The device could also be used in any situation where supersaturated water is undesirable.

FOR ADDITIONAL INFORMATION: Contact: Joe Fuss, National Fishery Research and Development Laboratory, R.D. No. 4, Box 63, Wellsboro, PA 16901; (717) 724-3322.

0440 Device Stores and Discharges Metered Fluid: A portable device accepts, stores, and discharges a preset amount of fluid

National Aeronautics and Space Administration, Washington, DC.

Sep 83 (D, F)

A hand-held container accepts a measured amount of liquid from a pressurized supply. The supply pressure drives a spring-loaded piston that stores enough mechanical energy to discharge the measured liquid into another container. An

operator triggers the discharge by turning a valve handle. The original application of the container was to rehydrate sterilized prepackaged food in the zero-gravity environment of space vehicles. Its possible terrestrial applications include the dispensing of toxic fluids or the metering of fluids for household, commercial, or laboratory uses.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20275.

0441 Diagnostic Instrument for Fusion Reactors: Instrument successfully measures tokamak atomic-deuterium outflux at energies below 100 eV

Department of Energy, Washington, DC.

Jul 83 (J, K)

A spectrometer has been developed for measuring the energy spectra of neutral deuterium atoms emitted from fusion plasmas at 20 to 1,000 eV. These spectra are useful in diagnosing certain critical properties of the plasma, such as central and edge ion temperature, energy balance in the electron and ion components, and neutral-atom and plasma densities.

FOR ADDITIONAL INFORMATION: Order document DE82012761 (AO14) from NTIS.

Digital Circuit Analyzer: Logic board tester makes a powerful diagnostic tool in design, production, and maintenance

See 0234

0442 Dual Gamma Device Developed to Analyze Materials

Department of the Army, Washington, DC.

Nov 83 (H, K)

Researchers have been perfecting techniques for nondestructive analysis of materials through the use of a dual gamma nuclear radiation device. The device is currently involved in research on the freezing process in soils (i.e. changes in moisture content and density with time) and in determining moisture content in insulating materials and the location of that moisture within the insulation. By measuring the intensities with the beam passing through a dry material and then the same material when the water content of that material can be determined. Subsequent measurement of the intensity of the beam after passing through the wet material will show the change in water content as a function of time and position.

FOR ADDITIONAL INFORMATION: Contact: Richard Berg, Cold Regions Research and Engineering Laboratory, Hanover, NH 03755; (603) 643-3200.

0443 Eddy Current Technology Extends to Graphite Epoxies

Department of the Navy, Washington, DC.

Oct 83 (G, H, K)

The Naval Surface Weapons Center has demonstrated that eddy current technology can be used for the non-destructive inspection of graphite epoxy composite materials. Both eddy current and ultrasonic methods of non-destructive inspection permit wide-area scanning of a material. However, eddy current technology has an advantage over ultrasonics because no couplant material is required to couple the energy to the material. Consequently, a structure can be eddy-current inspected in the field without submerging the structure in a tank of water or placing a jet of water between the probe and the materials. The limitations imposed by the very low graphite epoxy conductivities (on the order

of 0.1% IACS) can be overcome with a proper coil design and inspection frequency.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer, Code E411, March 83 No. 4, Naval Surface Weapons Center, Dahlgren, VA 22448.

0444 Electric-Field Probe for High-Voltage Insulators: An acoustic probe and method measure electric fields nondestructively in solid and liquid insulators

Department of Energy, Washington, DC.

Nov 83 (B, C, K)

An acoustic electric-field probe and method make it possible to measure nondestructively electric fields and space-charge distributions in solid and liquid insulators. Electric fields in such insulators as polymers can be investigated to depths of tens of centimeters, as opposed to depths of just a few millimeters by other conventional acoustical techniques. The apparatus uses an acoustic pulse generator. The pulses are passed through a charged insulating material under test and picked up by an acoustic receiver that is connected to a minicomputer through an analog-to-digital converter. Electric fields in tetrafluoroethylene, for example, have been measured with a resolution of about 1 mm and a sensitivity of about 10 V/mm.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,326,417, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. For further information, contact Albert Migliori, Los Alamos National Laboratory, Group P10, MS 764, Los Alamos, NM 87544.

Electronic Load Tests High-Voltage Solar Arrays: An adjustable load is provided by a combination of transistors and resistors

See 0325

0445 Enzyme Pollution Biodection Systems: Development of a field instrument

Department of Commerce, Washington, DC.

Jul 83 (C, J, K)

Research was conducted on enzymes as the detection agent in a field instrument for detecting and monitoring toxic materials in marine waters. Ten enzymes were chosen for laboratory tests considering such factors such as commercial availability and cost, stability, previous documentation and ease of measuring toxic material effects. Classes of pollutants used in the tests were metals, organochlorine pesticides and phenols. Four enzymes which seemed practical for incorporation into a field instrument were chosen for field testing. The enzyme G6PD which showed sensitivity to seven of the 13 priority pollutant metals was incorporated into a prototype instrument sensitive to metal ions (tests have been conducted at concentrations of .0001M). Problems involving stabilizing enzyme and instrument properties appear to have been solved in the laboratory.

FOR ADDITIONAL INFORMATION: Contact: William Woodward, System Planning and Development Office, National Ocean Service, 6010 Executive Boulevard, Rockville, Md. 20852; (301) 443-8444.

0446 Evaluating Coordinate-Measuring Machines: Three-dimensional ball plate and statistical analysis show the user whether the machine can adequately measure a given product

Department of Energy, Washington, DC.

Jul 83 (F)

A two-part study of electronic coordinate-measuring machines (CMM's) presents a Latin square method to evaluate these machines in three dimensions and a statistical-analysis technique to identify 15 potential sources of error in the machine Geometry. The CMM's are state-of-the-art in automatic three-dimensional measuring equipment. Current methods of determining their measuring capability are complex and are not readily available or used by most manufacturers. The analysis reveals both quantitative measures of precision and the systematic error of a CMM in three dimensions and identifies the sources of error in the machine geometry. The proposed ball plate method takes 70 percent less time than some conventional techniques.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order numbers: DE82-002146 and DE82-002430, price codes: A03 and A04.

0447 Fabry-Perot Photoelectric Spectrometer: A new design provides high luminosity and resolution

Department of Commerce, Washington, DC.

Mar 83 (J, K)

Fabry-Perot photoelectric spectrometers have become widely employed in very high-resolution studies of (extended) faint sources since this type of spectrometer has been found to have the highest luminosity-resolution product of any device that depends on the interference of light for its operation and has a spectrum and its output. A twin-etalon scanning spectrometer is disclosed that provides high luminosity and high resolution. The etalons are positioned in spaced relationship with respect to one another in series in the part of an emission light source. With identical etalons so positioned, a line emission transmitted by the rearwardly positioned etalon is at the same angles as that of the forwardly positioned etalon and the light transmission through the etalons is therefore at a maximum. By varying the spacing between maximum and minimum, modulation of the incoming light is effected, which modulated radiation is then collected by a detector with the resulting electrical signals then being processed for display.

FOR ADDITIONAL INFORMATION: Contact: Office of Government Inventions and Patents, National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161; (703) 4874732. Refer to PAT-APPL-6,436,124.

0448 Fluidic Gas Concentration Sensor: Study demonstrates a reliable way of detecting dangerous concentrations of hydrogen sulfide and hydrocarbon gases

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 (J, K)

A study for the U.S. Army Electronics Research and Development Command has demonstrated a working fluidic sensor for detecting dangerous levels of hydrogen sulfide and hydrocarbon gases on offshore-drilling platforms. While additional work is needed to attain a higher sensitivity to hydrogen sulfide and a steadier response to methane in air, the feasibility of fluidic technology has been firmly established. The fluidic gas-sensing technique used in the study

involves drawing a gas sample and splitting the stream into two identical parts. One part becomes the sample gas; the other is fed through a chemical processor that reacts with the gas of interest to supply a reference gas. The resultant change in the bulk gas properties is detected with an appropriate fluidic sensor. Methane can be detected in air in concentrations of 0.01 to 2.5 percent with acceptable repeatability.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A085777, price code: A04.

0449 Fluidic Oscillator Flowmeters

Department of the Army, Washington, DC.

Apr 83 (K)

The fluidic laminar proportional amplifier (LPA) has been used with feedback to construct oscillator circuits that can be used to measure volume flow rates. These circuits yield a frequency output that can be easily transduced to electrical signals using inexpensive microphones. The resulting electrical signals can then be processed to provide a direct readout or to close the loop in a control circuit. Other circuits, similar in concept to those described above, can be designed to suit other specified ranges of flow for air or other gases.

FOR ADDITIONAL INFORMATION: Contact: ATTN: DELHD-RT-CD, Fluid Control Branch, 2800 Powder Mill Road, Adelphi, Maryland 20783; (202) 394-3080.

0450 Formaldehyde Surface Emission Monitor

Department of Energy, Washington, DC.

May 83 (J, K)

The formaldehyde surface emission monitor is a passive sampling unit for in situ nondestructive testing of formaldehyde emission levels from individual stationary sources. Sampling is accomplished by sealing the open side of the monitor to a test surface for a three-hour collection period. A solid sorbent (13X molecular sieve) methodology is used which provides excellent chemical stability for sorbed formaldehyde, eliminates measurement problems caused by the condensation of water vapor, and permits the monitor to be used in any physical orientation. The formaldehyde is desorbed from the sieve using a water rinse. The extract is then filtered and selectively analyzed for formaldehyde with a conventional colorimetric method. This technology was developed by Thomas G. Matthews at the Oak Ridge National Laboratory and Funded by the Department of Energy and the Consumer Product Safety Commission. Private use of this technology is encouraged. Application include low-cost, nondestructive, quality-control method for selective grading of pressed-wood products, and in situ monitoring method for inspection or troubleshooting of formaldehyde emission from pressed-wood products or urea-formaldehyde foam insulation in living environments.

FOR ADDITIONAL INFORMATION: Contact: D.W. Jared, Oak Ridge National Lab P.O. Box X, Oak Ridge, TN 37830; (615) 574-4192. Refer to 452/X/TN.

Heat Activated Stench Gas-Tracer Gas Mine fire Warning System

See 0830

0451 High Temperature Optical Fiber Thermometer: New instrument measures temperatures to 2000 C

National Bureau of Standards, Washington, DC.

Apr 83 (D, K)

A new high temperature optical fiber thermometer made from a single crystal sapphire has been developed. The instrument will permit scientists and engineers to measure temperatures to 2000 C--an increase of 500 C above the maximum operating temperature of the present thermocouple standard. The new device has the potential to be 10 times more accurate than the existing standard. In gas streams, the optical fiber thermometer responds eight times faster than conventional measurement techniques. The device also has lower heat transfer losses and therefore can measure temperatures at lower gas stream velocities. It should prove useful for measurement and control of high temperatures in gas turbines and internal combustion engines, as well as in chemical processes. Other possible uses of the optical fiber thermometer are for power generation equipment, nuclear energy systems, weapons, space applications and similar areas. Measurements made with this thermometer are free from the interference effects caused by strong nuclear and electromagnetic radiation fields.

FOR ADDITIONAL INFORMATION: Contact: Mr. Roger Rensberger, National Bureau of Standards, Washington, DC 20234; (301) 921-3181. Refer to TN-5387.

High-Resolution Subsurface-Interface Radar: Mathematical technique yields more accurate information about depth of soil layers

See 0831

0452 High-Temperature Carbon-Furnace Thermometer: Process temperatures between 1,500 and 2,600 K are measured accurately without the inconveniences inherent in pyrometers

Department of Energy, Washington, DC.

Jan 83 (G, K)

A recently developed thermometer simplifies measurement of process temperatures of hot pressing of ceramics in carbon induction furnaces. The instrument is just as accurate as pyrometers in use, but does not demand operator skill as do manual pyrometers or frequent calibration, cleaning, and electronic maintenance as do automatic pyrometers. Furnace temperatures are measured via a radiometric sensor mounted inside a constant-temperature optical fixture that is sighted into a fixed-path graphite target tube.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report order number: DE82001862, price code: A02 or contact D.D. Smith, Oak Ridge Y-12 Plant, Building 9203, Oak Ridge, TN 37830; (615)574-0917.

0453 Holographic Microscopy System: System achieves 2 micro m resolution throughout a 100-cm³ sample volume

National Aeronautics and Space Administration, Washington, DC.

Sep 83 (J, K)

A holographic system originally developed for testing theories of two-liquid systems could be used for measurements of aerosols, particles in a transparent medium, or microscopic biological specimens. The holograms are recorded in 3- to 5-millisecond exposures on high-resolution holographic film using the system shown in the figure..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: NASA-TM-82437, price code: A04.

Impactor for Monitoring Contaminant Particles in Air: Virtual impactor separates fine and coarse particles for more accurate air-pollution monitoring

See 0411

0454 Improved Atomizer Resists Clogging: A simple new design eliminates clogging

National Aeronautics and Space Administration, Washington, DC.

Apr 83 (D)

An improved atomizer produces a uniform mist with droplet concentration that remains substantially constant over time. The fine mist and constant-output make it especially useful for the generation of aerosols, cloud-physics studies, the production of thin uniform coatings, and inhalation therapy. The new atomizer has been used to make mists with micron-sized droplets. It can be operated in any position, with pressures of 10 to 100 psi and liquid-flow rates of 0.05 to 2.0 cu/min.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div., P.O. Box 8757, BWI Airport, MD 21240, Refer to MFS-25631/TN.

Improved Monitor for Alpha Emission in Air: Instrument is compact, accurate, and quiet

See 0855

0455 Inspecting Deep, Narrow Boreholes: Curved reflector provides a brights, realistic image of bore wall

Department of Energy, Washington, DC.

Oct 83 (D, K)

A device allows the viewing of small-diameter, deep boreholes with minimal optical distortion. The device, composed of rod optics, is particularly suited for inspecting small holes for corrosion--holes as small as 1/16 in. in diameter and as deep as 4 in. The wall of a bore can be viewed either directly through the rod lens at a shallow angle or, with the aid of a curved mirror, at a more revealing 90 degree angle. The wall can be viewed directly by a human observer, by a still camera, or by a low-light color video camera. Besides bore inspection, the device can be used for such applications as the inspection of inaccessible areas for contamination and the measurement of dynamic fluid flow.

FOR ADDITIONAL INFORMATION: The patent on which this technical note is based is U.S. Patent 4,281,929, which is available from: Commissioner of Patents, Washington, DC 20231 \$1. For licensing information contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

0456 Inspecting Interior Surfaces: Lightguides and couplings to light sources are evaluated

Army Materiel Development and Readiness Command, Alexandria, VA.

Apr 83 (K)

The use of illuminators in combination with fiber-optic lightguides for inspecting inaccessible interior surfaces was researched. The combination provides convenient, safe, inexpensive, and intense illumination for interior surfaces of pipes, tubing, gages, valves, and containers. A low light loss can be attained by the use of a floating alignment bushing made of polymeric material and a spring retainer in

each optical-fiber channel to maintain the required separation between channels.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A092890, price code: A02 or contact project officer Vito G. Campisi (518) 266-5328

0457 Instrument Looks Into Jet Engine

Department of Navy, Washington, DC.

Jan 83 (K)

A viewing instrument for inspecting the inside of a jet engine is an assembly of commercially available components. Its basis is a colonoscope, a medical instrument having about a three-foot-long flexible tube attached to a control unit. The colonoscope's optics bundle is replaced with a fiberscope, which can be used for four-way remote viewing. A stainless-steel bar is attached to the guide tube to provide rigidity. The instrument can be used in any engine having an access opening large enough to accommodate the guide tube and stiffening bar.

FOR ADDITIONAL INFORMATION: Contact: Navy Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, VA 22448. Refer to 0708070.

0458 Ion Mass/Velocity/Charge Spectrometer: m/q is resolved to 1 part in 40

National Aeronautics and Space Administration, Washington, DC.

Sep 83 (J, K)

An ion spectrometer, originally developed for spacecraft analysis of the solar wind and cometary ions, distributes ions two-dimensionally and measures three characteristics of the incident-ion beam: mass/charge distribution, ion velocity distribution, and the direction of incidence. It could also be useful for diagnosis in experimental plasma physics in the collisionless regime. Ions that enter from directions within the field of view are reflected by a charged-grid electrostatic mirror into the accelerator grids.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15423.

0459 A Kit for Detecting Bacteria and Viruses: Feasibility of the kit and its tests has been demonstrated

Army Materiel Development and Readiness Command, Alexandria, VA.

Apr 83 (E)

The rapid detection of viable bacteria and viruses in the field is the subject of a study which identified the basic requirements for a field test for the identification of bacteria and defined the conditions for the preparation of stable lyophilized reagents. The study also demonstrated the feasibility of detecting nucleic acids and bacteriophage by binding phenazinium methosulfate (PMS) and later reacting it with reduced pyridine nucleotide and an indicator.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A091 796, price code A03.

0460 Laser Flaw-Detection System: Proposed system offers speed and flexibility for production-line testing

Army Materiel Development and Readiness Command, Alexandria, VA.

Jul 83 (H, J, K)

A recently-proposed optical detection system uses two lasers that combine speed and flexibility in detecting flaws in solid materials. Developed by the Harry Diamond Laboratories, the system operates remotely, requiring no physical contact with the test sample. The rapid scanning and reduced limitations on the size and shape of the test sample make the system far more versatile than conventional systems using piezoelectric transducers that entail complex, time-consuming scanning procedures. It was shown that the system can detect longitudinal flaws 2 mm deep by 10 mm long.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A086124, price code: A03, or contact project officer Ronald J. Wellman, (301) 278-3677.

0461 Locating Small Leaks In Large Structures: Dead needle pinpoints small leaks

National Aeronautics and Space Administration, Washington, DC.

Oct 83 (K)

A dead needle technique pinpoints the exact locations of very small leaks in plumbing and vacuum systems. The new technique confines helium exposure to a small region rather than flooding the entire leak area with helium gas. The test tool uses a fine-control valve and a hypodermic needle. After needle is filled with helium, the pressure is allowed to fall to atmospheric level, so that no helium, the pressure is allowed to fall to atmospheric level, so that no helium actually flows from the needle if the air is still. As the needle is brought up to a leak, the leak-induced airflow draws helium from the dead needle, through the leak, and into the helium detector. This occurs only when the needle is very close (less than about 1 mm), so the leak can be located to within a small area. This technique could be applied in industrial situations. Examples would be nuclear-powerplant plumbing, valve-and-pump bodies, vacuum systems, or pressure vessels.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for the commercial use of this invention should be addressed to the Patent Counsel, Johnson Space Center, Mail Code AL-3, Houston, TX 77058; (713) 483-4871. In either case refer to MSC-20327/TN/

0462 Measuring Formaldehyde Concentration In Indoor Air: Impregnated filters and test atmospheres for calibration make monitoring possible at parts per billion

Department of Energy, Washington, DC.

Aug 83 (J, K)

Monitors have been developed for measuring the concentration of formaldehyde in air at concentrations as low as 10 parts per billion and a method for generating test atmospheres to calibrate the monitors has also been developed. The monitoring technique uses a glass-fiber filter treated with sodium bisulfite. The active samplers are small and light and therefore are easily worn near the work area.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-001226, price code: A03. for information not in the report contact: Kristin L. Geisling, Lawrence Berkeley Laboratory, Building Ventila-

tion and Indoor Air Quality program, Berkeley, CA 94720; (415) 486-6072.

0463 Measuring Individual Phase Velocities In Flows: Statistical correlation is used to distinguish components

Department of Energy, Washington, DC.

Nov 83 (D, K)

An instrument measures the individual flow velocities of the phases in multiphase fluids. For example, it measures the separate velocities of gas and liquid in a flowing mixture of steam and water. The instrument is not limited to two-phase flow. It can measure velocities in three-phase and higher-order mixtures as well. The instrument uses upstream and down-stream probes to detect the spectral energy of material flowing in a pipe. The probes pick up broadband acoustic energy created by the flow and feed it to amplifiers that split the energy into channels.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-013587, price code: A02. For licensing information contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

0464 Measuring Mirror Tilt With High Accuracy: Stroboscopic technique freezes mirror motion so that displacements can be measured

National Aeronautics and Space Administration, Washington, DC.

Jun 83 (K)

An improved autocollimator accurately measures the angular tilt of plane mirrors in rotational or reciprocating motion. The device is a conventional autocollimator in which the steady light source is replaced by a stroboscope that can be synchronized with the mirror motion. It is accurate to 1 second of arc. The stroboscopic autocollimator produces a collimated beam of light, the cross section of which is in the shape of a reticle pattern. The moving mirror reflects the light back to the autocollimator, which reimages the light on the source reticle pattern. When the autocollimator light is strobed in synchronism with the motion, it freezes the image of the mirror position for measurement. The stroboscopic autocollimator can also be used for vibration analysis. For example, to measure the frequencies of vibration of a component, a mirror is attached to the component, and the autocollimator is aligned with the mirror.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: GSC-12701/TN. Inquiries concerning license for its commercial development may be addressed to the inventor, Mr. Thomas J. Magner, Goddard Space Flight Center, Code 702.1, Greenbelt, MD 20771.

0465 Measuring Small Hollow Spheres: A new method is relatively easy and involves minimal handling

Department of Energy, Washington, DC.

Aug 83 (K)

The outer diameter and wall thickness of small, buoyant, spherical shell, less than 1 mm in diameter, is rapidly and easily determined by measuring the velocities in fluid-filled tubes. In contrast, conventional laser-interferometric, microradiographic, and microscopic techniques for obtaining the dimensions are time-consuming, cumbersome, require trained operators, and are generally unsatisfactory for mass production. The apparatus includes two collinear tubes having different

inside diameters and the time it requires for a sphere to fall in them.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,308,750, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. DOE, Washington, DC 20585.

0466 Measuring Steam and Water Flow With Gamma Rays: Movement through a medium, such as sand, can be studied

Department of Energy, Washington, DC.

Nov 83 (J, K)

The measurement of gamma-beam attenuation provides an accurate indication of the liquid saturation in a variety of studies of fluid mechanics in porous substances. Current applications of the technique involve steam and water flow, the filtration of solids from liquids, and drying phenomena. Calibration requires only that minimum and maximum gamma-beam attenuation distributions be defined.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: SAND 80-2433, price code: A05. For information not in the report, contact Daniel C. Reda, Sandia National Laboratories, Division 1511, Albuquerque, NM 87185; (505) 844-4916.

0467 Measuring the Electrical Properties of Epoxies: Resistances of precisely molded specimens are tested with a four-point probe

National Aeronautics and Space Administration, Washington, DC.

Apr 83 (H, K)

Two new techniques rapidly determine the low-frequency resistivity of conductive epoxies and the high-frequency dielectric properties of insulating epoxies. Electrical resistivity of conductive epoxy resins can be determined conveniently and accurately with the aid of a mold that holds epoxy specimens while they cure and during property testing. Conductive epoxies are widely used as replacements for solder in semiconductor packages, and a wide variety of epoxy formulations is available.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div., P.O. Box 8757, BWI Airport, MD21240. Refer to MFS-25656/TN.

0468 Measuring Void Fractions in Liquids Containing Gas: Impedance-variation probe and circuit measure local void fraction in flowing liquid

Department of Energy, Washington, DC.

Sep 83 (J, K)

The void fraction in a flowing liquid containing bubbles of gas is measured by placing an impedance-variation probe in the flowing liquid and applying a constant voltage or current through the probe. The new method is local as opposed to the global measurement that gives void fraction over a large area. Most of the existing void-fraction measurements are global; previous methods that use 'resistance probes' to perform local measurements have had problems of resolving two adjacent voids. The new probe and circuit offer a better resolution.

FOR ADDITIONAL INFORMATION: Contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585. The patent document is

available from Commissioner of Patents, Washington, DC 20231. Patent 4,282,481.

0469 Micrometer for Measuring Trepanned Grooves: Tool accurately measures groove diameter where standard callipers are not feasible

National Aeronautics and Space Administration, Washington, DC.

Apr 83 (F, K)

A special micrometer measures the diameter of a circular groove on the face of a large part, while the part is mounted in a lathe chuck. The tool has a curved frame (like that on an ordinary micrometer, but larger), so it can reach around an obstruction on the centerline of the part. The tool was developed to permit measurements during the machining of a 26-inch groove on the flat face of an engine nozzle, which has a tolerance of 2 mills.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div., P.O. Box 8757, BWI Airport, MD 21240. Refer to MFS-19704/TN.

0470 Microprocessor-Controlled Evacuation and Backfilling: Hermetically-sealed electronic assemblies are filled with a tracer gas to facilitate leak testing

Department of Energy, Washington, DC.

Feb 83 (A, G)

A prototype microprocessor-based evacuation and backfill system pumps the air out of an electronic assembly, such as an integrated fusing system, fills it with an easily-decayed inert gas (such as argon) to a specified overpressure, and seals it. The outstanding feature of this system is its flexibility, which allows it to work on assemblies with various volumes. If a leak is detected, the microprocessor controller prints an error message and stops the cycle.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report order number:DE82-007627, price code:A03.

0471 Mobile Air Sampler: Vehicle-mounted sampler gathers specimens along highways and in tunnels

National Aeronautics and Space Administration, Washington, DC.

Jul 83 (K)

A simple device for collecting air samples is used on a moving vehicle. It therefore provides realistic specimens for the analysis of air quality along highways and in tunnels. In contrast to fixed air-collection installations, the mobile sampler requires no official approval for its use on highways. Size is not critical; the essential requirement is that the tube not restrict the flow of air through it. Sealing caps at both ends of the tube not restrict the flow of air through it. Sealing caps at both ends of the tube are spring-activated.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15220.

0472 New System Monitors Fuel and Water Levels in Storage Tanks

Department of the Navy, Washington, DC.

Sep 83 (B, D, K)

A new electromagnetic level indicating (EMLI) system using time domain reflectometry (TDR), being developed for Fleet use at the David Taylor Naval Ship Research and Development Center (DTNSRDC), will provide a highly reliable method of monitoring fuel and water levels in storage tanks. The final system configuration is modular electronics,

which will be simple and automatic, requiring much less maintenance than tank level indicators currently used throughout the fleet. Investigations show that a system suitable for shipboard use can be designed with better than 0.25-inch resolution in the level measurement and can indicate the oil/seawater interface in ballasted tanks. The system would thus consist of a rugged, corrosion-resistant sensor with no moving parts, a TDR electronics module, and a signal processing module to convert the TDR output into a suitable display and/or control signal.

FOR ADDITIONAL INFORMATION: Contact: Navy Technology Transfer Fact Sheet, Code E411, Naval Surface Weapons Center, Dahlgren, VA 22448. Refer to 080603.

NMMW Radiation Detector: Hot-electron photoconductive detection of NMMW radiation was observed in mercury/cadmium telluride single crystals

See 0859

0473 Nondestructive Testing of Light Sensitive

Semiconductors: Defects in solar cells are revealed from their intrinsic internal resistance when they are forward biased

Department of Energy, Washington, DC.

Jul 83 (B, C, K)

A new method uses an optical scanner to reveal cracks, regions of poor metalization, and resistive losses in solar cells or photodetectors, when they are forward biased. The technique is nondestructive, requires no electrical contacts to the cell other than those already present, and can be used on encapsulated or nonencapsulated cells in almost any laboratory or test environment.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,287,473, which is available from: Commissioner of Patents, Washington, DC 20231, for \$1.00. For licensing information, contact: Office of Assistant General Counsel for Patents, US DOE, Washington, DC 20585.

0474 Nondestructive Testing of Magnesium/Alumina Composite: Internal flaws are located by a variety of techniques

Army Materiel Development and Readiness Command, Alexandria, VA.

Aug 83 (H, K)

Several nondestructive testing techniques have shown different degrees of ability to locate defects in a new metal/fiber composite material. Experiments were conducted for the U.S. Army Materials and Mechanics Research Center on samples of a magnesium alloy reinforced with alumina fibers to verify flawdetection techniques for use in improving the manufacture of this material. The best flaw indications were given by ultrasonic scanning with a 15-MHz compression wave from a focusing transducer operating in the pulse-echo mode, with output displayed as an analog C-scan.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A119 996, price code: A07.

0475 On-Line Monitoring of Coal/Oil Mixture Fuel: An evaluation is made of instruments that measure key parameters of coal/oil fuel on line

Department of Energy, Washington, DC.

Jul 83 (C, K)

A number of process instruments have been evaluated for on-line characterization of coal/oil mixtures (COM). Included in the characterization of COM are measurements of mass flow, coal content or density, and viscosity, which are important for efficient boiler operation. One instrument, a mass-flow meter, which operates on the Coriolis force exerted by a fluid flowing through a U-tube, was found to work very satisfactorily, particularly in monitoring rapid changes in flow rate. Another flow meter, which provides an electrical-output signal proportional to volumetric flow, was judged to work very well except in low flow ranges. Both instruments were found to be independent of coal-particle content, viscosity, or temperature.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-004486, price code: A02 or for information not in the report contact Dr. M. P. Mathur, Pittsburgh Energy Technology Center, P.O. Box 10940, Pittsburgh, PA 15236; (412) 675-5740.

0476 Optical Accelerometer: Optical monitoring of the motion of a simulated piston in a cylinder is demonstrated

Department of Energy, Washington, DC.

Sep 83 (A, K)

The position and velocity of a piston moving in a cylinder are determined by optically monitoring the motion of a code plate with optical fibers and a microprocessor. The mechanism is used in accelerometers to actuate switches or springs during the measurement of acceleration in various weapons and missile systems. Optical fibers are attractive since they are resistant to electromagnetic interference, radiofrequency interference, electromagnetic pulses, and radiation doses.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-014535, price code: A03. For information not provided in the report contact Merton M. Robertson, Sandia National Laboratories, Division 2154, Albuquerque, NM 87185.

0477 Optical Temperature Sensor Has Digital Output: Devices uses a Fabry-Perot multiple-beam fringe sensor

National Aeronautics and Space Administration, Washington, DC.

Dec 83 (K)

A new fiber optic instrument can measure temperatures reliably and accurately. A remote light source feeds light into an optical fiber or cable. The measurement end of the fiber is attached to a Fabry-Perot sensor, which consists of a small spacing that varies with temperature. This spacing is controlled by a temperature-sensitive material. A second output fiber transmits the light passing through this 'Fabry-Perot' gap to a photodetection unit and finally to a decoder, before the output is routed to the utilization means. A number of advantages accrue to this optical system. Both the temperature sensor and the optical lines are free of all electrical and electromagnetic effects and interference. Variation in the spacer can be made sensitive to other physical quantities, such as pressure. The sensing element itself can be made quite small, enhancing its use in confined areas.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: NASA-CR-159519, price

code: A05. Inquiries concerning rights for the commercial use of this invention should be addressed to the Patent Counsel, Lewis Research Center, Mail Code: 500-311, 21000 Brookpark Road, Cleveland, OH 44135. (216) 433-4000, Ext. 346.

0478 An Overview of Nondestructive Evaluation: Report discusses present and future methods

Army Materiel Development and Readiness Command, Alexandria, VA.

Aug 83 (H, K)

A report by the U.S. Army Missile Command reviews five basic and seven advanced nondestructive evaluation (NDE) methods to familiarize those who can use it in quality control and laboratory studies. Stress and fracture analysts, for example, should find NDE useful in verifying their theoretical work. Five commonly used NDE methods for flaw detection include liquid-penetrant, magnetic-particle, radiographic, eddy-current, and ultrasonic testing.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A085945, price code: A09 or contact project officer John A. Schaeffel, Jr. (205) 876-5692.

0479 Passive Detection of Leaks in Buried Pipes: A correlation of acoustic signals pinpoints the location of the leak

Department of Energy, Washington, DC.

Jul 83 (D)

An improved technique--especially helpful with pipes running under concrete or other paving and carrying corrosive or flammable fluids--is based on an analysis of acoustic signals produced by the leak. Pipe leaks can be detected in two ways: In one variation, two transducers are placed a length apart on the surface of the buried pipe. Knowledge of the distance between the two transducers and of the velocity of propagation of the detected waves is enough to interpret the correlogram to locate the leak. In another variation, both transducers are placed at the same location.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,289,019, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1.00. For licensing information, contact: Office of Assistant General Counsel for Patents, USDOE, Washington, DC 20585.

0480 Personal Dust Monitor

Department of the Interior, Washington, DC.

Aug 83 (E, K)

Studies were undertaken to provide a means for continuous measurement and display of respirable dust concentrations in a mine so that when high dust levels occur, timely, corrective measures can be taken. A dust monitor was developed that is small and light enough to be worn by a miner, has the capability to continuously measure the respirable fraction of coal dust, will display the respirable dust concentration in mg/cu m, and can store the average respirable dust concentration and sampling time of several sampling shifts for later playback. The monitor uses light scattering and convection air currents to sample the respirable fraction of coal dust.

FOR ADDITIONAL INFORMATION: Contact: Robert P. Vinson, Bureau of Mines, Pittsburgh Research Center, Cochran Mill Road, P.O. Box 18070, Pittsburgh, PA 15236; (412) 675-6646.

0481 Phase-Sensing Guidance for Wire-Following Vehicles: An array of coils senses phase changes that occur when the wire is crossed

National Aeronautics and Space Administration,
Washington, DC.

Oct 83 (B)

A guidance system for wire-following vehicles has been tested successfully at speeds exceeding 50 mi/h on a difficult 1-mile course. Unlike previous sensors that compare the amplitudes of signals picked up from the guide wire, the new system compared the signal phases. The phase-sensing system is less sensitive to electromagnetic noise than was the amplitude-sensing system. In addition, the system remembers the last position of the wire and validates a new position only if it falls immediately on either side of the previous position.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15341/TN.

0482 Portable Acoustic Bearing Tester: Vibrations give clues to bearing wear

Army Materiel Development and Readiness Command,
Alexandria, VA.

Aug 83 (F, K)

A portable semiautomatic electronic tester diagnoses bearings in operation and indicates whether they should be replaced. The tester, developed for the U.S. Army Aviation Research and Development Command, is designed to be used in field maintenance by semiskilled operators. In the tester, the input-amplifier pulse generator band-pass-filters the accelerometer signal, detects the amplitude modulation, and converts the damped accelerometer bursts to a train of shock pulses.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A083652, price code: A06.

Portable I/V-Curve Tester: Battery-operated electronic load displays current/voltage characteristic on a portable oscilloscope

See 0365

0483 Portable Magnetic-Field Meter Developed For Use in Industrial Applications

Department of Commerce, Washington, DC.

Jun 83 (B, K)

Scientists at the National Bureau of Standards have developed a portable magnetic-field meter useful in characterizing workplace environments that are suspected of having or known to have high localized magnetic-field components of electromagnetic fields. Designated MFM-10, the new instrument is intended to serve as a survey tool, measuring magnetic fields emanating from various high-power radiofrequency sources, including industrial equipment and antennas. Battery-operated and requiring only a single probe head, the instrument offers wide frequency coverage (300 kHz to 100 MHz) and large dynamic range. In addition to covering low-frequency industrial sources, the MFM-10 frequency range also covers the commercial AM and FM radio bands, most amateur bands, and television channels 2 through 6. Design specifications and performance data are in the public domain.

FOR ADDITIONAL INFORMATION: Contact: Fred McGehan, Division 360.2, National Bureau of Standards, Boulder, Colo. 80303.

0484 Portable Radiometer Identifies Minerals in the Field: Field unit determines spectral reflectance ratios

National Aeronautics and Space Administration,
Washington, DC.

Jan 83 (K)

A hand-held optical instrument aids in identifying minerals in the field. It can be used in exploration for minerals on foot or by aircraft. The instrument -- a radiometer -- is especially suitable for identifying clay and carbonate minerals. It bases its identifications on the characteristic distributions of wavelengths in Sunlight reflected by minerals. Essentially, the radiometer measures the reflectances of a mineral at two wavelengths, computes the ratio of the reflectances, and displays the ratio to the user.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div., P.O. Box 8757, BWI Airport, MD 21240. Refer to NPO-15234.

0485 Pressure-Decay Measurements Improve Bubble-Point Test: A new technique improves the detection of flaws in wire-mesh screens

National Aeronautics and Space Administration,
Washington, DC.

Jun 83 (D)

Flaws in screen mesh are sometimes detected by a 'bubble-point' test, in which the screen is immersed in a liquid, removed, and then pressurized from below until a steady stream of bubbles emerges from somewhere on the screen surface. The pressure at which bubbles are first observed is related to the size of flaws on the screen. A new technique reduces by a factor of about 100 the minimum detectable flaw size in the bubble-point test. By measuring the rate of slow leakage, flaws as small as about .0001 sq in are detected. Since the technique does not require observation of the screen, tests can be run on screens already installed inside tanks and pipes.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-18970.

0486 Process Developed to Detect Microdefects in Turbine Blades

Department of the Navy, Washington, DC.

Aug 83 (H, K)

A gas penetrant technique has been developed to detect microdefects in turbine blades. The research began because liquid penetrant inspection cannot see microflaws such as hot tears and microshrinkage in cast turbine blades. This new process, gas penetrant inspection is able to locate small flaws because gases can be adsorbed at defect sites too small to admit a liquid. The gas penetration method can see manufacturing and service flaws below optical resolution. The process, called Krypton Exposure Technique, KET, extends the proven usefulness of the penetrant approach into the microdefect range. In the KET process, a harmless mixture of Krypton gases is made to adsorb along the interior surfaces of the microdefects. Since five percent of these gases emit low energy beta particles, a spray-on emulsion can make these concentrations of gas visible..

FOR ADDITIONAL INFORMATION: Contact T. E. Elasser, Naval Air Propulsion Center, P.O. Box 7176, Trenton, N.J. 08628; (609) 896-5751.

0487 Production Testing of Electro-optical Components: Fully-automated test facility allows customized measurements

Army Materiel Development and Readiness Command,
Alexandria, VA.

Jan 83 (K)

A proposed test facility will perform specific optical tests at the system or component level. It will measure such parameters as focal length, optical transfer function, large-area scatter, and spectral characteristics. A selection of tests can be custom-designed to characterize a system under its normal range of operating conditions. The test facility concept was proposed as the result of a survey of current optical testing methods.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A099 757, price code: A04 or contact project officer Peter D. Paulson, (201) 532-1832.

Production-Line Testing of Oscillator Sensitivity: Effect of reflected signal is simulated in a small test chamber

See 0176

A Radiation Detection System: Special fluors emit light at wavelengths greater than 500 nm and with a decay time of less than 10 ns in response to radiation

See 0861

0488 Rapid Inspection System for Complex Assemblies: Direct viewing allows X-ray radiographic examination at low cost

Army Materiel Development and Readiness Command,
Alexandria, VA.

Nov 83 (G, K)

A prototype system using advanced nonfilm radiographic techniques has been developed to perform rapid structural verification of complex assemblies. Design, Construction, and evaluation of the system were conducted for the U.S. Army Missile Command. Previous inspection methods, which have used film to obtain X-ray images of the structures, are unsuitable for high-rate production due to high labor and film costs and excessive flow time. The system consists of three principal components: a real-time X-ray system digital image processing, and computer-aided inspection. Evaluation of the real-time prototype system has resulted in estimates of an 8-to-1 cost reduction and 5-to-1 flow-time reduction.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number AD-A098658, price code: A04 or contact project officer John H. Honeycutt (205) 876-1074.

0489 Real-Time Radiographic Inspection System: An advanced fluoroscopic system enables X-ray inspection in high-volume production

Army Materiel Development and Readiness Command,
Alexandria, VA.

Jan 83 (G, K)

A prototype nonfilm X-ray system has been developed for the inspection of large complex parts and assemblies. The equipment features real-time X-ray radiography, digital image enhancement, remote part positioning, and automatic computer-aided operation. Computer-aided inspection can be performed with automatic control of part positioning and image processing if desired. Likely areas for extension

of the new technique include the inspection of castings, welds, and composites. Because of potential cost benefits, further development could lead to the elimination of most film-based radiography.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report order number AD-A098658, price code: A11 or contact project officer Ned M. Loery (205)876-2065.

0490 Scanning Seismic Intrusion Detector: An array of sensors is scanned to locate a signal source

National Aeronautics and Space Administration,
Washington, DC.

Jan 83 (B)

An intrusion detector may find uses in industrial-security systems. The new unit adds multiplexing and scanning electronics to conventional detector circuitry, so that a single operator can monitor an area served by a large number of seismic sensors. Typical sensors used with the new system are moving-coil seismic pickups.

FOR ADDITIONAL INFORMATION: Contact: The Patent Counsel, Ames Research Center, Mail Code: 200-11A, Moffett Field, CA 94035, or Technology Transfer, P.O. Box 8757, BWI Airport, MD 21240. In either case refer to ARC-11317.

Screening Tests for MNOS Memory Chips: Retention and endurance at normal operating voltage can be projected from low-voltage tests

See 0218

0491 A Sensitive Dilatometer for Pipes and Vessels: Small pressure variations inside pipes and vessels are measured externally

Department of Energy, Washington, DC.

Jul 83 (D, K)

A sensitive dilatometer, mounted externally on pipes, measures low-level pressure variations of the fluids inside. The instrument has strain gages that detect diametral dilations and contractions of the cylindrical surface. Since diametral displacement is in direct proportion to the pressure variation of the flowing fluid, the strain recordings produce data that can be readily correlated to produce pressure readings. Pressure variations of 3 psi have been detected with this dilatometer on an 8-in. pipe. Because the dilatometer is mounted externally, it has a number of advantages over the conventional instrumentation. For example, it is safer to use the dilatometer on pipes that carry toxic or caustic fluids. The instruments that measure pressure internally, on the other hand, need couplings through the pipe to the recording equipment. These couplings disturb the structural integrity of the pipes.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,290,311, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1.00. For licensing information contact: Office of Assistant General Counsel for Patents, US DOE, Washington, DC 20585.

0492 Signal Conditioner for Gas Alarms: Alarm-system capability is expanded to a variety of gases

Department of Energy, Washington, DC.

Nov 83 (J, K)

An enhanced interface unit (signal conditioner) enables a number of different gas sensors to be coupled to a commercial, flammable-gas alarm system. With the help of the

new interface, toxic, nonflammable gases can also be detected. The signal conditioner is a buffer-amplifier system that isolates the gas sensor electrically from the alarm controller.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-012890, price code: A02. For information not provided in the report, contact Robert E. Strout, Sandia National Laboratories, Division 8461, Livermore, CA 94550, (415) 422-3049.

0493 Sophisticated Electron Microscope Developed

National Institutes of Health, Bethesda, MD.

Mar 83 (E, J, K)

A new instrument to analyze and display a specimen's elemental makeup as well as its morphological microstructure has been developed. This new electron microscope imaging system, composed of an analytical electron microscope (AEM) and a digital computer, correlates a specimen's microstructure with its microchemistry on a scale of a hundred atom diameters. The imaging system is the result of four years of intensive work. Incorporating an electron microscope, the new analytical instrumentation chemically analyzes a specimen. Digital computers collect and process data and produce an image on a color display. Colors in the image represent the distribution of different elements in the specimen.

FOR ADDITIONAL INFORMATION: Contact: Electron Beam Imaging and Spectroscopy Group, National Institutes of Health, Bethesda, MD 20205; Telephone: (301) 496-2599.

0494 Stable Aerosol Generator: Aerosol concentration and particle size remain constant for hours

Department of Energy, Washington, DC.

Apr 83 (K)

An aerosol generator produces particles of uniform size and concentration over long time periods. With the aid of vacuum and atmospheric pressure, the generator maintains a constant level of solution in its aspirating tube. Aspiration conditions therefore remain essentially constant and so does the aerosol created by the aspirator assembly.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,298,496, which is available from: Commissioner of Patents Washington, DC 20231 for \$1.00. For licensing information, contact: Office of Assistant General Counsel for Patents, US DOE, Washington, DC 20585.

0495 Surface Photoacoustic Microscopy:

Nondestructive technique detects flaws 1 to 300 micrometers beneath the surface

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (H, K)

A method for characterizing the surface and near surface of metal and nonmetal objects employs scanning photoacoustic microscopy (SPAM) techniques to reveal voids, open and closed cracks, and inclusions. Preliminary evaluation of the method was conducted for the U.S. Army Tank-Automotive Command Research and Development Center. The method involves thermal-waves imaging in which an intensity-modulated and focused laser establishes a point source of heat to scan the sample surface. By varying the chopping frequency of the laser the resulting thermal wave can probe down 2 mm below the surface and surface roughness and subsurface discontinuities are detected from vari-

ations in thermal properties. To assess the applicability of the method to nonmetal materials, photoacoustic images were taken of rubber samples.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A121591, price code: A03 or contact project office Jacob Patt (313) 574-6378.

0496 A System for Testing Optical Fibers: Cerenkov light pulses generated in an optical fiber are used to determine the transmission characteristics per unit length of the fiber

Department of Energy, Washington, DC.

Jul 83 (J, K)

A technique has been developed for determining nondestructively the attenuation coefficient of low-loss, optical-fiber waveguides over a broad spectral region on a continuous range of fiber lengths. The technique uses the generation of Cerenkov light pulses at several points along the length of an optical fiber. The time-domain distributions of transmitted pulses are transformed to a wavelength domain by measuring the relationship between the arrival times of the various spectral components.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,292,537, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1.00. For licensing information, contact: Office of Assistant General Counsel for Patents, US DOE, Washington, DC 20585.

0497 Tapped-Hole Vent Path: Meshing threads create a long vent path for hot, pressurized gas

National Aeronautics and Space Administration, Washington, DC.

Jun 83 (F)

A long helical vent path safely releases hot gases from a pyrotechnically activated valve. Before it was fitted with the vent, the valve leaked pressurized pyrotechnic gases into a gas-sampler bottle, contaminating the sample and creating a potentially explosive mixture. The vent consists of a threaded hole and a mating stud. The gas vents slowly through the helical path between the threads of the hole and the stud. The outer diameter of the stud is slightly reduced to create a controlled cross-sectional area. Other uses are possible for this vent. It could be used to meter the flow in refrigeration, pneumatic-control, and fluid-control systems by appropriately adjusting the size and length of the vent path.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20146/TN.

0498 Temperature, Density, and Level Measurement System

Department of Energy, Washington, DC.

Jun 83 (K)

A variety of special instruments for measurements in high-temperature, high-pressure two-phase flow has been developed. On such recent activity has been the development of an ultrasonic sensor to measure the water level in the reactor vessel of a pressurized water reactor. The sensor is a thin, rectangular stainless steel ribbon that acts as an acoustic waveguide which is contained inside a perforated tube. The waveguide is attached to a section of magnetos-trictive material that is inserted through a pair of transducer

coils. These two transducers are excited alternately to generate both torsional ultrasonic waves, using the Wiedemann effect, and extensional ultrasonic waves, using the Joule effect in the sensor. The measured torsional wave transit time is a function of the density, level, and temperature of the fluids surrounding the waveguide. The measured extensional wave transit time is a function of the temperature of the waveguide only. Consequently, the transit times from each reflecting surface can be analyzed to yield a temperature profile and a density profile along the length of the sensor. The principal application is to provide a continuous indication of the level, temperature, and density of the water inside a nuclear reactor vessel to indicate core cooling adequacy. Any application for which level and/or temperature and density profile measurements in fluids is desired may be accommodated.

FOR ADDITIONAL INFORMATION: Contact: D.W. Jared, Oak Ridge National Laboratory, P.O. Box X, Oak Ridge, TN 37830; (615)574-4192. For publications, request support package 454/X/TN.

A Ternary Liquid Scintillator: Liquid scintillator makes an effective radiation-to-light converter

See 0863

0499 Testing Electroexplosive Devices: Electrothermal response (ETR) testing, a nondestructive quality-assurance tool, can identify potential product faults

Department of Energy, Washington, DC.

Jul 83 (K)

Improved ETR testers have been developed to evaluate hot-wire devices incorporating pyrotechnics and other energetic materials. These components usually have a bridgewire resistance of 1 ohm or greater and a temperature coefficient of resistance (TCR) of the bridgewire that is sufficiently large to facilitate their testing with low current levels. The ETR testing is a technique for uncovering flaws in component design or manufacturing procedures that no other nondestructive test can detect. The use of this testing technique has uncovered component flaws that X-ray, resistance testing, or visual inspection have not detected. Although the test does not predict component failure, it does indicate the probability of failure or unwanted conditions.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-012694, price code: A02.

Thermography for Testing Composites Nondestructively: The state-of-the-art is reviewed

See 0764

0500 Ultrasonic Testing With Improved Resolution: Single-crystal metal wedge, producing higher frequency acoustic signals, improves the resolution

Department of Energy, Washington, DC.

Jul 83 (H, K)

A nondestructive method utilizes ultrasonic waves (Rayleigh waves) generated at high frequency (up to 270 MHz) to detect surface flaws and inhomogeneities in solid materials at high resolution. The improved method uses a metal wedge, made from a pure crystal of either Ti, Zr, V, Nb, Ta, Au, Pd, or Pb or metal alloys having an electron-per-atom ratio of between 4.3 and 5.5 to produce Rayleigh surface waves. Surface flaws and cracks produce a change in the

amplitude of the Rayleigh wave, while inhomogeneities, like an implanted ion layer, change the velocity of the wave.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,313,070 which is available from: Commissioner of Patents, Washington, DC 20231 for \$1.00. For licensing information contact: Assistant General Counsel for Patents, US DOE, Washington, DC 20585.

0501 Unique Chemical Gas Sensors, No Bigger Than a Pen

Department of the Navy, Washington, DC.

Oct 83 (J, K)

Researchers at the Naval Research Laboratory have developed several new types of chemical vapor microsensors for use in detecting certain toxic gases. These new sensors, making use of the latest techniques in solid state electronics, microfabrication, and miniature optical components, are well suited for field applications. The sensors are no larger than an ordinary writing pen. One of the new sensors is an optical waveguide device that can detect, among other gases, minute amounts of ammonia vapor simply by a coloration change in a specific film coated onto a small capillary tube. The ammonia sensing agent, which is coated as a thin solid film onto the waveguide surface, is an oxazine perchlorate dye. Other chemical microsensors being developed can detect very small changes in the acoustic and electrical properties of specific coatings as a function of vapor concentration. Because of the ruggedness, small size, and low cost, such sensors can be employed as personnel dosimeters and remote control devices for many environmental monitoring and chemical detection applications.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer, Code E411, April 83, Naval Surface Weapons Center, Dahlgren, VA 22448.

0502 Unique Superconducting Bolometer Operates at High Cryogenic Temperatures

Department of Navy, Washington, DC.

Feb 83 (B, K)

The Naval Research Laboratory has invented a new type of superconducting bolometer that promises many applications both for use in research and for systems operating in a cryogenic environment. These bolometers are composed of very thin films of niobium nitride. The inventors have announced an ultrafast granular superconducting bolometer that can respond to energy pulses shorter than a billionth of a second at temperatures between 2 and 12 Kelvin. The researchers envision the use of such devices for systems that require very fast sensing of energy pulses, such as the detection of electromagnetic signals (microwave, infrared, visible, and beyond) as well as heat pulses propagating in crystalline or amorphous solids (phonons). These devices have already been used as the detectors for optically excited time-of-flight phonon spectroscopy on various semiconductors. The devices should enhance such systems as communications, high-frequency soundwave detection, and other systems requiring fast, shortwave pulses.

FOR ADDITIONAL INFORMATION: Contact: Navy Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, Virginia 22448. Refer to 070904/TN.

0503 Vacuum Ampoule Isolates Corrosive Materials: A quartz vacuum container assures reliable thermophysical measurements of molten materials

National Aeronautics and Space Administration,
Washington, DC.

Sep 83 (H, J, K)

A quartz vacuum ampoule provides a measurement window and sample containment isolation for determining the thermophysical properties of semiconductor materials in a molten state. The quartz ampoule permits reliable measurement of the melt properties of a materials such as lead/tin/telluride (PbSnTe). Confinement of the sample in a vacuum prevents contamination of the measurement system by not corrosive vapors and any interference by preferential evaporation of the melt.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: LAR-12898.

0504 Vehicle Shock and Vibration Tests: Guidelines for testing wheeled and tracked vehicles are provided

Army Materiel Development and Readiness Command,
Alexandria, VA.

Oct 83 (D, K)

The determination of shock and vibration characteristics of a vehicle involves measuring structural response along with the response of individual components, equipment, cargo, and personnel. Test operating procedures for both wheeled and tracked vehicles were prepared for the U.S. Army Test and Evaluation Command. Also included are descriptions of three levels of human exposure to standardize test results. The test procedures require mounting transducers such as accelerometers, free or rate gyroscopes, and displacement or strain gages at various key locations on the vehicle to provide a comprehensive determination of the shock and vibration regimes.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A106358, price code: A02.

0505 Video Target Tracking and Ranging System: A microcomputer-controlled two-camera TV system would track a moving object and determine its range and range rate

National Aeronautics and Space Administration,
Washington, DC.

Oct 83 (A, B)

A proposed microcomputer-controlled system computes the range and range rate of a moving object being tracked by two TV cameras. The pan and tilt (azimuth and elevation) angles of each camera are controlled by correction signals derived from the camera video signals. The range and range rate of the object are computed by triangulation from pan- and tilt-angle data and known camera coordinates. The system could be useful for target ranging at distances up to about 1,000 feet in such applications as vehicle collision avoidance, traffic monitoring, and surveillance. It might also substitute for short-range radar in situations where the radar signal could not be tolerated.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20098/TN.

0506 Water-Vapor Sample Holder for Mass Spectrometers: A sample of ambient air is captured for use as a calibration standard

National Aeronautics and Space Administration,
Washington, DC.

Jan 83 (K)

A metal sample holder introduces the reference standard sample of water vapor into a mass spectrometer. It contains a known volume that is sealed with a thin aluminum disk. The disk is punctured to inject the water vapor into the mass spectrometer. The holder contains a sample of ambient air before the cap is attached. Thus, the sample captured when the cap is attached contains a sample of water vapor in the air. Because the relative humidity of the local atmosphere is measurable, the sample has a known composition that can be used in calibrating the peaks produced by mass spectroscopy. The sample holder will be used in quality assurance testing and analytical testing of the water-vapor content of failed integrated-circuit modules.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div., P.O. Box 8757, BWI Airport, MD 21240. Refer to NPO-15007.

MANUFACTURING & INDUSTRIAL ENGINEERING

0507 Aligning Massive Equipment Accurately: Computerized laser system allows simple and precise measurements of displacement

Department of Energy, Washington, DC.

Dec 83 (D)

Large objects can be positioned with high accuracy with respect to a reference line by a laser-based surveying system incorporating an automatic-readout micrometer. Developed for aligning the electromagnets, which direct nuclear-particle beams from an accelerator, the system virtually eliminates operator error. A laser-beam line of sight is set up by centering a laser beam on a target at two separate positions.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,320,0577, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1. For licensing information contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

Aluminum Integral-Color-Anodizing Process: Hard-coating imparts black coloring and excellent abrasion resistance

See 0655

0508 Analyzing Hazards in Production Equipment: The goal is to prevent machinery failures and a shutdown of production

Army Materiel Development and Readiness Command,
Alexandria, VA.

Apr 83 (G)

A report discusses an analysis directed toward the prevention of production-equipment failures. Six typical metal-parts plants were surveyed to determine whether hazards exist in their industrial-process equipment and, if so, to determine what can be done to avoid future problems. Equipment considered included roller-hearth furnaces, rotary-hearth furnaces, salt baths, box furnaces, induction-heating units, and forge presses. The equipment was subjected to fail-safe analysis, which establishes the effect of the failure of plant systems and surrounding equipment.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A090662, price code: A04 or contact project officer Raymond F. Pohl (201) 328-2295.

0509 Anchor for Fiberglass Guy Rod: An aluminum fitting attaches securely to the rod end

National Aeronautics and Space Administration, Washington, DC.

Mar 83 (F)

Fiberglass rods are excellent for guying antenna support structures, because the fiberglass is transparent to radio waves and therefore does not distort the radiation pattern. It is also strong, light, and weatherproof. However, anchoring the rods is difficult. A solution to this problem is to install a nut with threads on the outer circumference, followed by an aluminum sleeve. The sleeve has an opening that is oval at its upper end and round at the bottom end.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-14970/TN.

0510 Assembling IC Chips from Tape Reels: Tape-automated bonding reduces costs and increases reliability

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (B, G)

A report describes work done in developing a pilot assembly line for manufacturing hybrid microcircuits by tape-automated bonding (TAB). The purpose of the work was to demonstrate the feasibility of TAB and to determine the associated yield and cost factors. The report, which was prepared for the U.S. Army Electronics Research and Development Command, includes an overview of these factors, the methods and equipment employed in the manufacture of approximately 1,200 hybrid microcircuits with TAB, and the qualification test results of the circuits using the TAB mounted devices.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A104393, price code: A06.

Assembly of Photovoltaic Arrays: Heat lamps on a trolley melt reapplied solder

See 0313

0511 Asymmetric Die Grows Purer Silicon Ribbon: Graphite die distributes silicon carbide impurities asymmetrically

National Aeronautics and Space Administration, Washington, DC.

Aug 83 (C, H, J)

The concentration of carbide impurities in silicon ribbon is reduced by growing the crystalline ribbon with a die that has one wall higher than the other. The height difference controls the shape of the meniscus at the liquid/crystal interface and concentrates the silicon carbide impurity near one of the broad faces. The opposite face is left with above-average purity. This significantly improves the efficiency of solar cells made from the ribbon.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15385.

Austentizing Behavior of Low Alloy Steel: A minimum temperature of 1,425F can sufficiently austentize a low-alloy steel

See 0658

0512 Automated Process Control for Machining: A computerized control method for turning surpasses the existing handbook data and manual techniques

Army Materiel Development and Readiness Command, Alexandria, VA.

Mar 83 (A, G, H)

The U.S. Army Armament Material Readiness Command has sponsored a program to establish a computerized metal-cutting matrix for machining operations and parts characteristics, according to general size and finish tolerances. The system, which provides data applicable in production scheduling and quality control, is intended to aid process-and-operation planners, numerical-control programmers, production supervisors, and estimators. The machinability of metals was tested on 4140 steel at Brinell hardness levels of 200 and 300, using both high-speed steel and tungsten-carbide tools with a variety of tool shapes in conventional turning. As a data base for machinability equation was developed that relates all of the machining variables associated with the work material, the tool material and shape, the size of cut, the size of the workpiece, and the cutting fluid. Computer programs were developed for calculating the cutting speed for a given tool life. One is a convenient program for a hand-held programmable calculator that can be taken right out onto the shop floor.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A088416, price code: A06 or contact project officer R. A. Kirschbaum (309) 794-5363.

0513 Automatic Corrector for Quartz-Crystal Cuts: X-ray diffraction will locate cuts within arc-seconds

Army Materiel Development and Readiness Command, Alexandria, VA.

Aug 83 (B, D, J)

An automatic goniometer for quartz-crystal resonators is reported in the 'breadboard' stage of development for the U.S. Army Electronics Research and Development Command. The objective of the program is an automated production apparatus to measure and correct within arc-seconds the angles of cut of doubly-rotated (SC-cut) quartz crystals. The system is designed for use with crystal blanks already cut within about 30 arc-minutes of the desired plane.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A088063 price code: A03.

Automatic Measurement of Crystal Angles: Prototype system promises to reduce the cost of producing crystal resonators

See 0429

0514 Ball Joint for Quick Connections and

Disconnections: Joint is strong in shear and tension

National Aeronautics and Space Administration,
Washington, DC.

May 83 (F)

A proposed quick-connect/disconnect joint could be operated remotely, offers high strength in shear and tension, and allows rotational freedom. The joint consists essentially of an expandable collet that can be locked over a ball to form a ball-and-socket joint. To attach the joint, the user depresses a button protruding from the center of a release tool handle and inserts the tool into a sleeve on the collet. Releasing the button allows locking balls in the tool shank to grip the sleeve when the user applies a lifting force. It has a variety of other potential applications, for example: Grasping spherical objects in robotic machines; and Coupling pneumatic tubes.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: LAR-12896/TN.

0515 Barrier for Continuous-Crystal-Growth Crucible: Properly designed openings permit free flow of melt while restraining pellets

National Aeronautics and Space Administration,
Washington, DC.

May 83 (C, G, H)

A redesigned partition between the growth region and the melt-replenishment region of a crystal-growth crucible makes it less likely that the crucible will run out of feed material in the middle of a cycle. Melt replenishment makes possible the continuous growth of silicon web and thus is an important factor in low-cost production of quality solar cells.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD, 21240; (301) 621-0100. Refer to: NPO15338/TN.

Bearings and Seals for Helicopter Transmissions: Test results indicate improved bearings and seals for advanced helicopter transmissions

See 0003

0516 Bonding Prolongs Life of Sputter Target:

Technique extends life of hard, brittle, crack-prone targets, such as titanium diboride, by a factor of 50
Department of Energy, Washington, DC.

Mar 83 (G, H)

A high-temperature bonding technique has been developed for supporting sputter targets of such hard brittle materials as metal oxides, carbides, borides, and nitrides. When those materials are sputtered on a base material, they produce a thin hard wear-resistant coating for use in an abrasive environment; but as sputter targets they tend to break or come loose from their backing because of thermal stress during the sputtering process. This uncontrollable deterioration of the targets has limited the use of the hard materials for sputtering. In the new technique, the material to be sputtered is bonded to a thin metal backing plate that has the same coefficient of thermal expansion. Commercial use of the bonded target will allow sputtering to be a prime technique for applying hard coatings. The technique also opens new possibilities in the sputtering of other cermet and refractor materials.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by order-

ing the NTIS report, order number: DE82-002686, price code: A02.

0517 Boom Deploys With Controlled Energy Release: A lanyard and a spring-mounted viscous damper regulate rate of stored-energy expenditure

National Aeronautics and Space Administration,
Washington, DC.

Oct 83 (D)

A collapsible boom is deployed in a controlled fashion, yet has no electric or commandable elements. In effect, the structure consists of many fiberglass 'springs' that are forcibly coiled during initial stowage in a canister. A considerable amount of energy stored in the structure is released during deployment. The controlled deployment sequence allows a boom 27 feet long to be uncoiled from a canister only 2 feet high. Possible applications include antennas and other lightweight structures that are rapidly erected in the field.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Division, P.O. Box 8757, BWI Airport, MD 21240; 621-0100 Ext. 241. Refer to NPO-15418/TN.

Boronizing Transition-Metal Surfaces: Treated surfaces are hardened and protected against corrosion

See 0660

0518 Cable-Twisting Machine: A small cable twister is ideal for short production runs

National Aeronautics and Space Administration,
Washington, DC.

Feb 83 (F, G)

Uniformly twisted cable composed of up to 26 wires is made by a new machine that is ideal for short production runs. Using it, one operator produces finished cable in about one-fourth the time it previously took three people working by hand. Faster operation than typical industrial cable-twisting machines is made possible by using smaller spools of wire. The speed of rotation of the wheel is varied to generate different twists. A meter registers the cable length as it passes through the tension rollers.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div, P.O. Box 8757, BWI Airport, MD 21240. Refer to MSC-18874/TN.

0519 Calculating Clearances for Manipulators: Cylinders approximate structures and movements

National Aeronautics and Space Administration,
Washington, DC.

Jun 83 (D, F)

A set of algorithms rapidly calculates the minimum safe clearances for remote manipulators. Such calculations are used in the design of trajectories for manipulators to ensure that they do not accidentally strike surrounding objects-particularly important when the manipulator is sometimes out of view of its operator. Earlier attempts to calculate manipulator clearances required excessive computer time and memory. These attempts employed accurate and detailed models of the manipulator geometry and motion. The new set of algorithms describes the manipulator and adjacent structures in terms of enclosing cylinders. The clearance calculation method offers special benefits in industrial robotics, particularly in automated machining. Cutting tools can be described accurately as cylinders, and therefore the algorithms can predict interference efficiently. For more complex applications, surfaces of revolution may be used.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20208/TN.

0520 Casting Silicon Pellets From Powder: Fine silicon powder melts in a thin quartz bubble that breaks upon cooling

National Aeronautics and Space Administration, Washington, DC.

Dec 83 (G, H)

A new technique converts finely powdered silicon into solid pellets. The pellets are used in spark-source mass-spectroscopic analysis of the silicon and in electrical-resistivity measurements for detecting low-level contaminants. Powdered silicon is produced when silane is cracked in a free-space reactor. It must be converted to pellet form to perform the impurity testing. The new technique uses a thin-walled quartz mold. Although the quartz fractures on cooling, the solid silicon remains crack-free.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15272.

0521 Chemical Vapor Deposition in a Fluidized Bed: Woven materials are coated evenly

Department of Energy, Washington, DC.

Oct 83 (G, H)

In an improved chemical-vapor deposition (CVD) process, the fabrics of graphite, ceramic, or metal are coated with such materials as tungsten, molybdenum, nickel, rhenium, metal mixtures, metal carbides, or pyrolytic carbon. In contrast to earlier stationary methods, the article to be coated moves freely in a fluidized bed. Thus, on the average, every part of the item is exposed to the same chemical and physical conditions. The result is an even coating over all the parts of the fabric, including the finest strands. The new process is especially suited to the preparation of catalytic supports and wire cloths that have to withstand severe environments. It can produce the metal-coated cloths of short fibers that could not be woven after coating.

FOR ADDITIONAL INFORMATION: The patent on which this technical note is based is U.S. Patent 4,265,982, which is available from: Commissioner of Patents Washington, DC 20231 for \$1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

0522 Clog-Free Brazing of Porous Electrodes: Barrier prevents brazing alloy from being wicked into metal-electrode pores

Department of Energy, Washington, DC.

Oct 83 (B, G, H)

An improved brazing process simplifies the fabrication of positive electrodes for the rechargeable liquid molten-salt batteries. The problem of brazing a thin, 0.25-mm metal membrane to a metal honeycomb-backing substrate, without clogging the membrane pores, is eliminated by the use of a braze-flow barrier. This barrier prevents the alteration of the membrane porosity, which in this instance is 40 percent, the pore diameters being 2 micro m. The process involves separate treatments of the membrane and of the substrate before they are joined. The process can be used on porous membranes made from other metals; for example, iron, copper, and various alloys. Commercially available solutions of aluminum oxide, magnesium oxide, boron nitride, and magnesium hydroxide, dispersed in organic solvents, are also suitable as braze-flow barriers.

FOR ADDITIONAL INFORMATION: The patent on which this technical note is based is U.S. Patent 4,293,089, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

Coal Storage Hopper With Vibrating Screen Agitator

See 0318

Coating Cloth With Amorphous Boron-Carbide: High-quality amorphous boron-carbide coatings on cloth are deposited at lower temperature

See 0670

Coating Reduces Steel Piston Wear: An aluminum/bronze coating, applied by gas/metal arc welding, provides lubricity and wear resistance

See 0671

Coatings for Protecting Aluminum Alloys: Shot peening followed by integral color anodizing are the best combination

See 0672

0523 Computer Model Predicts Compressor Performance

Department of Navy, Washington, DC.

Feb 83 (A, D)

A computer simulation to predict the performance of an oil-flooded, single-screw air compressor has been successfully developed at the David W. Taylor Naval Ship Research and Development Center. The computer model predicts internal pressures, temperatures, and flow rates through the leakage paths during the compressor cycle using empirical external values as the basis for internal predictions.

FOR ADDITIONAL INFORMATION: Contact: Navy Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, Virginia 22448. Refer to 070903/TN.

Computer Models for VLSI Fabrication Processes: Far-more-complex device structures can be simulated

See 0230

0524 Computer-Aided Spiral-Bevel-Gear Forging: Machining time and material waste are reduced

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83

Computer-aided design and manufacturing techniques have been combined to eliminate costly machining of spiral bevel gears. In a project conducted for the U.S. Army Tank Automotive Command, gears were directly forged to net tooth dimensions within close tolerances, requiring only some finish machining on the back but none on the teeth. The computer-aided design and computer-aided manufacturing procedures have been integrated. Thus, the computer program calculates the shape of the forging die by taking into account both the desired gear shape and the interactions between the die and the workpieces. Although the computer-aided design, and manufacturing equipment are expensive, considerable savings are expected at mass production rates although the computer-aided design and manufacturing equipment are expensive, considerable savings are expected at mass production rates through the reduction of machining time and material waste.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by order-

ing the NTIS report, order number AD-A124578, price code; A06 or contact project officer Donald Ostberg (313)574-6065

Computerized Biomedical Man-Model

See 0054

0525 Conductive-Tape Substrate for Electroforming:

Metal tape has many uses in electroplating

National Aeronautics and Space Administration, Washington, DC.

Dec 83 (G, H)

Conductive tape is a versatile substrate for the electroforming of a strong mechanical bond between the two parts. By using a double layer of tape adhesive-to-adhesive, electrical continuity can be established whether or not the tape available has a conductive adhesive. Other uses of such tapes included: Taping a wire to a part to be plated, thus avoiding the need for a special clamp or fixture, and using the mechanical strength of the tape to support a part during plating.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB83-925812, price code E02.

0526 Conduit for Transferring Molten Silicon: A proposed three-part conduit would transfer pure silicon between crucibles

National Aeronautics and Space Administration, Washington, DC.

Jun 83 (F, H)

Transferring molten silicon from one vessel to another without solidifying or contaminating it would be possible with a proposed conduit. Silicon oxide and other impurities would be removed by extracting molten silicon through the conduit and away from the slag that forms on the surface of the melt. The conduit could be used in a process for growing continuous crystal ribbon for solar cells, where there would be no size limitation on the finished product, because the crystallization crucible could be continuously replenished with pure silicon. The conduit is composed of three major parts: a transfer tube, a heater, and a multilayered thermally insulating and reinforcing structure.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15109/TN.

0527 Connector for Composite Tubes: Elements made of composite join tubes at various angles

National Aeronautics and Space Administration, Washington, DC.

Jun 83 (F)

Difficulties in joining tubular structural members made of composite materials are overcome by improved connectors. The connectors are made from the same composite as the structural shapes, eliminating the stress and weight problems experienced with metal connectors. The composites also allow the joint strength to be optimized by properly choosing the fiber orientation and the fabric. Only two basic shapes are required to make 90 deg. and T-joints in a plane. The shape of the basic joint element is a cylinder with a tab on each side of a longitudinal gap. This technique can be applied to other regular-cross-section components made from composite materials. It can be used to assemble strong, lightweight, three-dimensional structures.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: LAR-12744/TN.

0528 Consolidating Submicron Silicon Particles: Fine silicon powder melts and solidifies atop a silicon pedestal

National Aeronautics and Space Administration, Washington, DC.

Jul 83 (D, G, H)

Two proposed techniques would use a molten pool of silicon at the top of a silicon pedestal to consolidate the submicron silicon particles produced by the silane process. The techniques avoid the contamination produced by casting containers. The consolidated material could be used directly to produce high-efficiency polycrystalline solar cells. In both processes, the shape of the molten layer together with the surface tension of molten silicon stabilize the layer and control the diameter of the consolidated material.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15250.

0529 Continuously-Variable Positive-Mesh Power Transmission: Speed ratio is controlled by coupling mechanical trigonometric-function generators

National Aeronautics and Space Administration, Washington, DC.

Feb 83 (F)

A proposed transmission with continuously-variable speed ratio would couple two mechanical trigonometric-function generators. The transmission is expected to handle higher loads than conventional variable-pulley drives; and, unlike a variable pulley, there is positive traction through the entire drive train with no reliance on friction to transmit the power. It would be able to vary speed continuously through zero and into reverse. Possible applications are in instrumentation where drive-train slippage cannot be tolerated.

FOR ADDITIONAL INFORMATION: Inquires concerning rights for the commercial use of this invention should be addressed to the Patent Counsel, Marshall Space Flight center, Mail Code: CC01, Marshall Space Flight Center, AL 35812. Refer to MFS-25461.

0530 Control for Compression-Molding Machines: A computerized hydraulic system provides constant velocity and pressure control for elastomer molding during precure stages

Department of Energy, Washington, DC.

Jul 83 (A, F, G)

A microprocessor/analog closed-loop, hydraulic-control system, developed and simulated for an elastomer compression-molding machine, is expected to reduce the amount of scrap caused by the variations in wall thickness and contour of the filled elastomer parts during compression molding. The conventional open-loop control of machine ram speed and hydraulic pressure results in inaccurate and nonrepeatable molding cycles. In the new design, a flow-control valve adjusts flow during the speed control and pressure during the load control.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: BDX-613-2483, price code: A04 or for information not in the report, contact Richard Floersch, The Bendix Corp., Kansas City Division, Box 1159, Kansas City, MO 64141; Telephone (816) 997-3039.

0531 Control System Damps Vibrations: An electromechanical control system compensates for the natural vibrational modes of a structure

National Aeronautics and Space Administration, Washington, DC.

Oct 83 (B)

A new control system damps vibrations in rotating equipment with the help of phase-locked-loop techniques. Vibrational modes are controlled by applying suitable currents to the drive motor. The control signals are derived from sensors mounted on the equipment. This system was developed for stabilizing the stator section of the Galileo spacecraft. The stator has four elastic modes below 10 Hz. One phase-locked loop (PLL) captures the resonance signal for each mode.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15002/TN.

0532 Controlled Rolling of Steel Armorplates: Effects of modified hot-rolling process are investigated on mechanical and ballistic properties of steel armor

Army Materiel Development and Readiness Command, Alexandria, VA.

Aug 83 (G, H)

A two-part study for the U.S. Army Materials and Mechanics Research Center investigated: the means to strengthen further the <111> texture of the medium carbon steel armor and the crystallographic texture formation of the austenitic steel system (A-286 alloy) so that textures other than those formed in quenched-and-tempered martensite could be produced and their effects on properties studied. The objective of the study was to see how controlled rolling with declining temperatures affected the alloy properties.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A083 167, price code: A04, or contact project officer Anthone Zarkades (617) 923-3111.

0533 Controlling Flow of Shear-Degradable Polymers: The key is gentle pressure reduction

Department of Energy, Washington, DC.

Sep 83 (F, G)

The flow of polymer solutions can be controlled--without damage to the polymers--with the aid of a new device. The controller can be adjusted quickly over a wide range of flow rates, but does not break up polymer molecules through excessive shear as conventional controllers do. The new controller applies a large pressure drop to the solution, gradually instead of abruptly, and thus avoids shearing the molecules. Valves on the controller can be opened and closed in a variety of combinations to provide the required flow.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,276,904, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1.00. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. DOE, Washington, DC 20585.

0534 Controlling the Rotation of Levitated Samples: Levitation and rotation modes are separated

National Aeronautics and Space Administration, Washington, DC.

Oct 83 (D, J)

In a proposed acoustic levitation system, the separate excitation of different acoustic modes would independently levitate and control the rotation of the sample. Three independent axes of rotation would be available, leading to rotation of the levitated object about any other selected axis. In the proposed system, the sample is levitated by using nondegenerate fundamental frequencies that do not cause rotation. Rotation is introduced either by adjusting the chamber dimensions to produce higher-frequency degenerate normal modes or by exciting degenerate normal modes in a chamber with specific length ratios.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15522/TN.

0535 Controlling Thermal Gradients During Silicon Web Growth: A slotted susceptor helps keep the melt-replenishment region hot

National Aeronautics and Space Administration, Washington, DC.

Jun 83 (C, G, N)

A strategically placed slot helps to control critical thermal gradients in a crucible for silicon web growth. The slot thermally isolates the feed region of the crucible from the growth region, so that the region where pellets are added stays hot. The heat absorbed by the pellets during melting can cause a thermal unbalance that can upset the growth conditions.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15337/TN.

0536 Conventional Machining of ESR 4340 Steel: Grinding wheel and proper dressing procedures are the key to efficient low-stress grinding

Army Materiel Development and Readiness Command, Alexandria, VA.

Apr 83 (G, H)

The U.S. Army Materials and Mechanics Research Center has sponsored a study of the conventional machining of electroslag-remelted (ESR) 4340 steel. A machining test program was conducted to establish optimum conditions and tools for turning, drilling, face milling, end milling, and grinding operations of ESR 4340 steel. The effects of cutting speeds, feeds, depths of cut, and cutting fluids on tool life were determined. All the operations provided to be extremely difficult and the application of conventional procedures was not feasible.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A008451, price code: A06 or contact project officer Arthur Ayvazian (617) 923-3233.

0537 Correcting an Electron Beam in IC Processing: Computer program provides correction for scattering in electron-beam lithography

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (B, G)

An analytical correction technique improves the geometrical distortion resulting from the scattering of electrons during the patterning of IC resists. Development of the method was conducted for the U.S. Army Electronics Research and Development Command. The scattering of electrons, also known as the proximity effect, seriously compromises the

resolution capabilities of electron-beam lithography for circuit patterning. The correction technique consists of a self-consistent scheme to adjust the electron-beam exposure within the desired pattern to achieve the correct geometry. This is accomplished by dividing the pattern into rectangular elements and calculating the exposure that will provide the same average dose in each element.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-112233, price code: A02 or contact project officer H. L. Berkowitz (301) 671-3164.

0538 Coulomb Friction Damper: A linear friction damper is effective at low velocities

National Aeronautics and Space Administration, Washington, DC.

Dec 83 (D, F)

A standard hydraulic shock absorber has been modified to form a coulomb (linear friction) damper. The device damps very small velocities and is well suited for use with large masses mounted on soft springs. In contrast, hydraulic dampers can be ineffective when the velocity is reduced. The piston of a conventional hydraulic shock absorber is replaced by a cylindrical friction pad that rubs against the inner cylinder wall. The coulomb friction damper is applicable in situations requiring large damping of small oscillating velocities. It contains no liquid that could leak or freeze and heaters, necessary for low-temperature operation of fluid dampers, are not needed. These dampers are therefore more reliable than fluid dampers and also more economical to build and to maintain.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20179/TN.

0539 CO2 Laser as a Machine Tool: Laser offers improved quality at lower operating cost

Department of Energy, Washington, DC.

Mar 83 (F, G)

A 1,000-watt CO2 laser has proved to be a versatile and reliable machine tool for a wide range of materials. More than 60 types of production parts have been fabricated by laser processing, with expected cost savings estimated over \$1 million. The laser has been used to cut and drill high-strength reinforced thermosetting-plastic laminates; to cut thermoplastic materials; to drill, cut, scribe, and mark ceramics; to cut wire-reinforced rubber; and to cut reinforced cloth materials. Development continues on other applications, including cutting titanium alloys and steel alloys, sealing glass-to-glass joints, soldering wire to connectors, and removing photoresist material from steel substrates. The important process variables have been identified.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-007647, price code: A03.

Curing of Furfuryl Alcohol-Impregnated Parts: A longer cure and improved quality control prevent delaminations

See 0099

0540 Cutter for Woven Materials: 'Guillotine' cutting tool makes clean cuts in fabric strips

National Aeronautics and Space Administration, Washington, DC.

May 83 (F)

A simple tool makes accurate square cuts through strips of woven or felted materials, such as high-temperature aramid fabric. Scissors, papercutters, and a knife with a roller were slower than the new 'guillotine' cutter in preparing aramid fabric strips. The new cutter gave the operator better control over the cut and resulted in sharper, well-defined edges. A razor blade is clamped in a holder that moves vertically in a bushed support bracket. A pivoted handle with a mechanical advantage of about 4 applies a downward force on the razor-blade holder.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20178/TN.

0541 Cutting-Fluid Conservation: A closed-loop reclamation system increases the longevity of a semiuniversal cutting fluid

Department of Energy, Washington, DC.

Jul 83 (F, G)

Tests were conducted in an effort to (a) find a semiuniversal cutting fluid that could replace several cutting fluids and satisfy multi-machining operations performed on a variety of metals and alloys and (b) increase the longevity of the cutting fluid by establishing cutting-fluid reclamation system. A general machine shop (a composite of several machine shops) was chosen as the test site for the development program. A closed-loop cutting-fluid reclamation system was designed, fabricated, and tested. In this system, dirty cutting fluid is removed from the machine sumps by the sump cleaning machine that filters the fluid to approximately 20 micro m.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-009655, price code: A02 or for information not in the report, contact H.T. Kite, Union Carbide Corp - Nuclear Division, Oak Ridge Y-12 Plant, Oak Ridge, TN 37830; (615) 574-3896.

0542 Cyanide-Free Electroplating Process: Alternative electroplating solutions provide cyanide pollution abatement

Army Materiel Development and Readiness Command, Alexandria, VA.

Aug 83 (G)

Replacements for cyanide-based cadmium and copper plating and derusting solutions were selected and evaluated to improve the quality of wastewater effluent from plants involved in electroplating operations. Finding a noncyanide plating solution was a more economical approach than building a separate sewer and chemical-destruction system for a plant. Two candidates for replacing the cadmium plating solutions appeared suitable for production - the Kadizid Bright Acid Cadmium System and the Cadvert Sulfate Cadmium System, according to a study of the U.S. Army Armament Materiel Readiness Command.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A121540, price code: A02 or contact project officer F. Testroet (309) 794-3287.

0543 Deburring Small Intersecting Holes: Study reviews five techniques available to the industry

Department of Energy, Washington, DC.

Apr 83 (D, G)

A review examines five deburring techniques that the industry can use on intersecting holes smaller than 60 mils in diameter. These include: thermal-energy, abrasive-jet, abrasive-flow, electrochemical, and manual methods. Each has capabilities and limitations the user should consider in selecting the most effective process.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: BDX-613-2418, price code: A03.

0544 Deep-Access Valve Wrench: A rod attached to an extension pipe holds the wrench jaw against the valve stem

National Aeronautics and Space Administration, Washington, DC.

Jul 83 (F)

A modified basin wrench makes it easier to open and close valves in deep valve boxes. Underground water valves, with broken or corroded handles can be operated with the tool. The basin wrench is modified by a long handle and a rod for holding the wrench jaw against the valve stem (see figure). To extend the reach of the wrench, a 55-1/2 inch length of 1/2-inch galvanized pipe is welded to its shaft.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: KSC-11229.

Densification of Silicon Nitride: Strength and fracture toughness are improved

See 0677

0545 Depositing Gold on Beryllium/Copper Contacts: Process coats as many as 600 contacts simultaneously

Department of Energy, Washington, DC.

Feb 83 (G)

A recently-developed dc sputter-deposition technique has successfully coated small, current-viewing resistor contacts with gold-film thickness ranging from 0.8 to 1.8 micrometers. The process, which can handle up to 600 small contacts in 1 batch, features precision. The beryllium/copper contact posts are only 9mm long and contain a 0.57-mm hole 5 mm deep. Gold film not only covers the exterior part of the contact but also the interior surface of the hole.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE81-025608, price code: A02.

0546 Device Makes Handtools 'Dropproof': Wrench handle and socket cannot be separated unless both are tethered

National Aeronautics and Space Administration, Washington, DC.

May 83 (F)

Two-part handtools are made 'drop-proof' by a mechanism originally developed for tools used by astronauts. The mechanism can be added to ratchet wrenches and other composite tools for which there is relative motion between the parts. An advantage of the new mechanism is that it secures both parts of the tool- for example, a ratchet wrench handle and a wrench socket-yet only one tether is attached to the tool while it is being used. In previous system, a tether was needed for each part, but the tethers interfered with the movement of the parts. Inquiries concerning nonexclusive or exclusive license for its commercial development are desired.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div., P.O. Box 8757, BWI Airport, MD. Refer to: MSC-20319/TN.

0547 Dip-Coating Fabrication of Solar Cells: Jets of gas permit rapid production

National Aeronautics and Space Administration, Washington, DC.

Jan 83 (C, G)

Inexpensive silicon solar cells can be made by a simple dip technique--provided that the postdip solidification of the semiconductor material is carefully controlled. A new apparatus provides such control by convective cooling and radiative afterheating. A ceramic wafer coated on one side with graphite is immersed in molten silicon. As the wafer is withdrawn, a polycrystalline film of silicon clings to the graphite side but not to the ceramic side.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, Technology Transfer, P.O. Box 8757, BWI Airport, MD 21240. Refer to NPO-15312.

Dust Control Hood for Bag-Filling Machines

See 0404

0548 An Economical Way of Finishing Metal Surfaces: Electrochemical apparatus removes unwanted metal in a fraction of time it takes to finish manually

Department of Energy, Washington, DC.

Mar 83 (F, G)

A recently-developed electrochemical machining apparatus incorporates a work-conforming electrode to remove excess metal left after cavity sinking, boring, planing, deburring, or polishing. The electrode can be readily tailored to fit complex or hard-to-reach surfaces. Because of this feature, surface finishing can be completed in a fraction of time of manual polishing. For example, the deburring of a carbon-steel plate 11 ft (3.3m) in diameter containing 18,600 holes can be completed in 3 to 6 hours as opposed to 48 man-hours of manual labor.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is base is U.S. Patent 4,202,739, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. DOE, Washington, DC 20585.

0549 Effectiveness of Water-Deluge Systems: Hardened systems can function even after exposure to an explosion

Army Materiel Development and Readiness Command, Alexandria, VA.

May 83 (D)

A program has identified water-deluge systems that can withstand explosions and still extinguish secondary fires. Test demonstrated that deluge systems, when properly adapted to their surroundings, can extinguish explosive fires in a reasonable length of time. The wide-spray nozzle proved to be more effective than the narrow-spray version in maintaining water on the explosive at different water pressures and damage levels.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A089983, price code: A05 or contact project officer Richard M. Rindler (201) 328-3828.

0550 Electrical Conduit Distributes Weld Gas Evenly: Flexible conduit with small holes provides even weld-gas coverage

National Aeronautics and Space Administration, Washington, DC.

Oct 83 (G)

A purge-gas distributor, made from flexible electrical conduit by drilling small holes along its length, provides even gas flow for welding. The previous method was to drill a rigid tube. The drilled flexible conduit is inserted into the part being welded and lightly pressurized with the purge gas. The escape holes plus the flexible joints in the conduit distribute the purge gas evenly throughout the interior of the part being welded. The flexible conduit adjusts to accommodate almost any shape. It can be used for gas coverage in other applications that previously needed formed and drilled solid tubing.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. BOX 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-19665/TN.

0551 Electro-Optical Inspection in Packing Processes: Two optical methods are proved feasible for automated packing line

Army Materiel Development and Readiness Command, Alexandria, VA.

Jan 83 (G)

Two high-speed, noncontacting, optical-inspection techniques are feasible in the automated packing of grenades into projectiles. This study, performed for the U.S. Army Materials and Mechanics Research Center, includes findings that are useful to other industries incorporating automated assembly lines. The first method used when the orientation is known involves fiber-optic proximity sensors. The second method used when the orientation is random is based on a band of light projected onto the grenade by light-emitting diodes arranged as two concentric circles.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A088413, price code: A02 or contact project officer Edward G. Kessler (201) 328-6334.

0552 Electroplating Chromium on Superalloys: Method provides excellent adhesion without the presence of an intermediate layer

Army Materiel Development and Readiness Command, Alexandria, VA.

Oct 83 (G, H)

The development of an activation method for treating cobalt-, nickel-, and iron/nickel-based superalloys for chromium plating was conducted for the U.S. Army Armament Research and Development Command. The method does not require a strike intermediate layer, used in the plating of stainless steel, which is detrimental to the high performance of plated alloys. A simple, qualitative test for evaluating the adhesion of thick chromium deposits was also developed.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A104313, price code: A02 or contact project officer Edward S. Chen (518) 266-5048.

0553 Etching and Growth of GaAs: Precise temperature control adjusts melt composition before each etch

National Aeronautics and Space Administration, Washington, DC.

Jul 83 (G, J)

A simple arrangement for etching away a surface layer of a gallium arsenide crystal before an epitaxial layer is deposited on it prevents an unwanted high-resistivity interface from forming. The etching and deposition setup is expected to simplify processing and improve the characteristics of gallium arsenide lasers, high-frequency amplifiers, and advanced integrated circuits.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15625.

0554 Etching Thin Niobium Films: Photofabrication of superconducting circuits is aided by a new etchant

Department of Energy, Washington, DC.

Feb 83 (B, G)

A carefully proportioned mixture of acids has been found to etch niobium and the niobium compounds Nb₃Ge and Nb₃Sn at a rate suitable for use in the fabrication of thin-film superconducting circuits. Furthermore, a modified formulation with slightly different proportions of the same ingredients is used to separate the thin-film circuits from the substrates upon which they are processed. Superconducting structures of this kind are being developed for low-heat-dissipation digital circuits incorporating Josephson junction.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,266,008, which is available for \$1.00 from the Commissioner of Patents, Washington, DC 20231. For licensing information, contact: Office of Assistance General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

Evaluating Coordinate-Measuring Machines: Three-dimensional ball plate and statistical analysis show the user whether the machine can adequately measure a given product

See 0446

Evaluating PC-Board Materials and Processes: Study evaluates the limits of fine-line resolution on copper-clad PC boards

See 0244

0555 Fabrication of Dual-Input Servovalve: Hydrofluidic servovalve for helicopter controls responds to electrical, fluidic, or mechanical signals

Army Materiel Development and Readiness Command, Alexandria, VA.

Aug 83 (D)

Electrical, fluidic, or mechanical control signals or any combination of the three can be converted into mechanical motion by a single servovalve fabricated with techniques developed for the U.S. Army Aviation Research and Development Command. The hydrofluidic servovalve can be a backup system, independent of the electrical power supply, in controls for helicopters and other vehicles. The use of a single servovalve, instead of three separate ones, reduces the cost, weight, and complexity of the control system. The servovalve uses two fluidic amplifiers in tandem to drive a piston in the desired direction. The amplifiers are specially made so that the tip of the fluid stream splitter can be moved laterally in the fluid stream.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A082443, price code: A03, or contact project officer George W. Fosdick, (804) 878-5251.

0556 Ferrofluid Would Seal Linear-Motion Valve: A magnetic fluid would seal against pressure or vacuum

National Aeronautics and Space Administration, Washington, DC.

Nov 83 (F)

A proposed valve would employ a ferrofluid to make a tight seal. The seal would require no precisely machined parts, and hand lapping of valve seats would be unnecessary. The valve consists of a hollow shaft with magnetically soft sheaths that can slide through a ring magnet with annular pole pieces. In its open position, the shaft carries gas, liquid, or vacuum through its hollow core. In its closed position, both ports on the shaft are on the same side of the wall, so that hole in the wall is sealed.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20148/TN. Inquiries concerning rights for the commercial use of this invention should be addressed to Marvin F. Matthews, Lyndon B. Johnson Space Center, Mail Code, AI-3, Houston, TX 77058 (713) 483-4871.

0557 Fine-Line Substrates for Microelectronic Hybrids: Size and material costs are cut by half

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (B, G)

Processes for the manufacturing of fine-line substrates with line widths and spaces down to 2 mils have been developed for the production of hybrid electronic circuits. A review of these manufacturing technologies was prepared for the U.S. Army Missile Command. Previously, industrial capabilities for producing substrates with high reliability were limited to 10-mil lines and 10-mil spaces. The process controls described include temperature, storage conditions, material inspections, and quality control. Also described are material requirements, including substrates, metalizations, and dielectrics. Design guidelines are provided along with fabrication guidelines, which range from art-work generation to evaluations of screens, emulsions, and via definitions.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A112162, price code: A07 or contact project officer G. Little (205) 876-3848.

0558 Fineblanking and Bonding Fluidic Components: Both methods proved promising in improving the product quality

Army Materiel Development and Readiness Command, Alexandria, VA.

Mar 83 (G)

Fineblanking and solid-state diffusion bonding are applicable to the manufacture of fluidic components, according to a study performed for the U.S. Army Electronics Research and Development Command. Both techniques have demonstrated the potential of improving the performance of laminated aluminum fluidic devices, tests with sample three-stage amplifiers had shown. Fineblanking, a precision-stamping process, was used to stamp an aluminum-alloy amplifier and amplifier-alloy laminates in thickness ranging from 0.20 to 3.18 mm.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A089347, price code: A05 or contact project officer Edward G. Kessler (201) 328-6334.

0559 Flexible Coupling Corrects Shaft Misalignments: Simple slotted tubes perform like a complex linkage

National Aeronautics and Space Administration, Washington, DC.

Jul 83 (F)

A proposed flexible coupling would provide nearly error-free measurements of shaft rotation in the presence of misalignments between the shaft and the position-sensing transducer. It is intended to be used in situations in which the input or output shaft is mounted on a flexible joint. Its function is to insure equal input and output shafts to remain parallel. The coupling consists essentially of a concentric pair of cylinders that act as a flexible link between two shafts. The coupling concept was originally developed for antenna-position control systems. It may also find application in machinery having higher rates of rotation than the antenna.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15393.

Flow Distribution In Hydraulic Systems: Program solves fixed or variable flow problems for series, parallel, or series/parallel systems

See 0906

0560 Fluid-Injection Tool for Inaccessible Areas: Sandwich construction is both thin and strong

National Aeronautics and Space Administration, Washington, DC.

Feb 83 (F)

A new tool injects liquids or gases into narrow crevices. It can be used to apply caulking and waterproofing compounds, adhesives, detergent, undercoats, and oil and to aerate hard-to-reach places. The tool consists of a thin, flat, triangular nozzle, containing many channels, attached to a distribution manifold.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and a diagram is available by ordering the monthly subscription package, order number PB83-925602, price code E02.

0561 Fluidic Amplifiers and Sensors: Recent developments in advanced flow-control systems are described

Army Materiel Development and Readiness Command, Alexandria, VA.

Dec 83 (D)

A guide is available on the design, performance, and fabrication of laminar amplifiers and sensors useful for a wide range of applications. The report was prepared for the U.S. Army Electronics Research and Development Command. Fluidic sensing and control systems, which are more rugged and have a much greater range of capabilities, hold the promise of replacing the costly, delicate mechanical systems. The guide starts with background on the development of fluid amplifiers and other laminar-flow devices and covers the geometry, performance, and scaling of laminar-

proportional amplifiers, amplifier format and staging, and typical circuit arrangements.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A114799, price code: A07 or contact project officer J. Joyce (202) 394-3080.

0562 Fluidic Devices for Mechanical Stabilization: A hydraulic analogy to gas-flow-aids design

Army Materiel Development and Readiness Command, Alexandria, VA.

Jun 83 (D)

The feasibility of stabilizing small arms by the use of fluidics has been investigated by the Harry Diamond Laboratories. The interaction between user and gun was studied to define the role of the fluidic-system components. A system consisting of angular-rate sensors, signal amplifier, a fluid-to-mechanical energy converter was postulated. The stabilizing fluidic devices would derive their power from the muzzle gas flow and recoil.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A092027, price code: A03 or contact project officer Lyndon S. Cox (202) 394-2755.

0563 Fluidic Pressure Regulator

Department of the Army, Washington, DC.

Jul 83 (D, K)

Pressure regulation is critical to fluidic circuits that are used for precision measurements or control. For example, the scale factors for signals from a bridge circuit are directly proportional to the bridge pressure. Also, the operation of the laminar jet angular rate sensor (LJARS) for low-threshold performance is highly dependent on maintaining a constant, quiet supply pressure. To overcome these problems, a fluidic pressure regulating circuit has been designed. The fluidic regulator is based on a set-point sensor--a modified laminar proportional amplifier (LPA) in which the power nozzle has been aimed at one of the outputs, the control nozzles have been enlarged, and the control finger on one side has been set back significantly. This regulating circuit has excellent potential for use with a number of fluidic circuits. It may also find extensive applications in many ordinary (i.e. non-fluidic) sensing systems such as gas chromatography and medical devices where a high degree of regulation is essential to good performance.

FOR ADDITIONAL INFORMATION: Contact: Harry Diamond Laboratories, ATTN: DELHD-RT-CD Fluid Control Branch, 2800 Powder Mill Road, Adelphi, Maryland 20783; (202) 394-3080.

0564 Fluidized-Bed Heat Exchangers for Waste-Heat Recovery: Shallow fluidized beds have higher heat-transfer coefficients and improved fouling resistance

Department of Energy, Washington, DC.

Jul 83 (D)

A two-part experimental and analytical study was conducted to evaluate the economic potential of shallow fluidized-bed heat exchangers to recover the waste heat from the exhaust gases of large diesel engines. The first part of the program involved experiments to measure the heat transfer, pressure loss, and fouling characteristics of a commercially available, shallow fluidized-bed heat exchanger. Results have shown that fluidized beds are a viable technical option

for waste-heat heat exchangers. They offer the potential advantages of improved surface fouling characteristics at a reduced cost, as compared with conventional finned-tube heat exchangers. In the second part of the study, the commercial, shallow fluidized-bed heat-transfer facility was modified to give increased air-flow capacity and to allow testing with different distributor plates and with two-stage heat exchangers.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DOE/ET/11348-T1 and DOE/ET/11348-T2, price code: A04 each or for information not provided contact Dr. William M. Thielbahr, US DOE, Idaho Operations Office, 550 2nd Street, Idaho Falls, ID 83401.

0565 Gettering Silicon Wafers with Phosphorus: Phosphorus absorbs impurities to improve the efficiency of solar cells

National Aeronautics and Space Administration, Washington, DC.

Jul 83 (B, C, H)

Silicon wafers subjected to gettering in a phosphorus atmosphere have longer diffusion lengths and higher solar-cell efficiencies than untreated wafers. The gettering treatment improves the properties of solar cells manufactured from impure silicon and is compatible with standard solar-cell processing.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-015357.

Gradient-Furnace Processing of Structural Ceramics: A process grows single crystals of sapphire measuring up to 6.5 in. in diameter

See 0699

0566 Growing Silicon Ribbon Horizontally: A faster growth rate is just one advantage over vertical drawing

National Aeronautics and Space Administration, Washington, DC.

Nov 83 (H, J)

Horizontal growth of silicon ribbon offers several advantages over vertical growth. It would be faster--possibly 1 to 2 centimeters per second--and could be done without using drawing dies, a source of contamination in vertical growth. The horizontal process would naturally create a doping profile (decreasing dopant concentration toward the top surface), and it lends itself to continuous removal of impurities from the silicon melt.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-14977/TN.

0567 Guide to Safety Analysis of Equipment: Procedures and checklists are provided

Army Materiel Development and Readiness Command, Alexandria, VA.

Jul 83 (K)

A report of the U.S. Army Test and Evaluation Command outlines development test procedures for identifying and evaluating hazards associated with a variety of supplies and equipment. The report provides guidance in setting up the testing program for an item, with suggestions for specific subtests to assure compliance with specific safety criteria. A checklist for each of the major hazard categories in-

cludes questions relating to frequently encountered hazards. For example, the list for electrical hazards asks whether grounding connections are strong enough to resist disconnection and whether all voltages are properly marked.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A086990, price code: A02.

0568 Handling of Gun Tubes During Manufacturing: Methods are proposed to reduce handling time

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 (G)

A time-and-motion study has been made of the manufacture of gun tubes of 12-in. diameter, 20-ft length, and weighing up to 4 tons. While the findings of the study apply only to this facility, the recommendations may stimulate efficiency improvements at machine shops and other facilities that process large parts.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A119652, price code: A03 or contact project officer Robert J. Meinhart (201) 328-2295.

0569 High-Pressure Vessel With Windows: Design, building, and testing have been successful

Department of Energy, Washington, DC.

Apr 83 (D, F)

A 13-liter pressure vessel with four windows was successfully designed, built, and tested. The vessel, intended for working pressure of 5,000 psi (34.5 MPa), will be used to visualize flow experiments conducted at the Sandia National Laboratories. The windows made the design difficult for two reasons: First, they had to withstand 20,000 psi (138 MPa) without failing. Second, the holes for the windows resulted in local high-stress concentrations and increased the complexity of the vessel analysis.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-011016, price code: A03 or for information not provided in the report, contact J.C. Keilman, Sandia National Laboratories, Livermore, CA 94550; (415) 422-2256.

0570 High-Production Silicon-Ingot Slicer: Spinning Ingots would be cut in balanced pairs

National Aeronautics and Space Administration, Washington, DC.

Oct 83 (F, G)

A new concept for slicing silicon ingots into wafers promises to increase production rates and to improve yields of good wafers, thereby reducing the cost of manufacturing silicon solar cells. In the proposed wafer slicer, a stack of ganged blades cuts a group of silicon ingots simultaneously. The blades cut horizontally while the ingots rotate about their vertical axes. Rotation of the ingots increases the net cutting speed and reduces by half the depth to which a blade must penetrate an ingot the sever a wafer.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15483/TN.

0571 High-Ratio Gear Train: Very high gear ratios would be obtained from a small mechanism

National Aeronautics and Space Administration, Washington, DC.

Feb 83 (F)

A proposed arrangement of two connected planetary differentials can result in a gear ratio many times that obtainable in a conventional series gear assembly of comparable size. Ratios of several thousand would present no special problems. A Selection of many different ratios is available with substantially-similar gear diameters.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div, P.O. Box 8757, BWI Airport, MD 21240. Refer to MSC-20054/TN.

0572 High-Temperature Captive-Nut Assembly: In an improved design, nuts corroded by high temperatures are replaceable

National Aeronautics and Space Administration, Washington, DC.

Mar 83 (F)

An improved plate-nut assembly, consisting of a shell and a self-locking captive nut, withstands service temperatures up to 1,600 F. The nut element is replaceable and floats in the shell to accommodate misalignment of the mating bolt or screw. Captive-nut assemblies are widely used in home appliances and other machinery to expedite assembly when nuts must be held in inaccessible places. In applications where the nuts encounter high temperatures, high-temperature corrosion can cause thermal wear of the threads, thus making replacement necessary. An improved assembly allows easy replacement. The high-temperature captive nut should prove useful in many industrial applications. A typical use would be in the heat shields of laboratory and vacuum ovens.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20010/TN.

Hybrid Microelectronic IC's as Timing Fuzes: Design employs custom monolithic IC's to reduce production costs

See 0252

0573 Impact-Cleaning Technology: A report surveys the field of impact cleaning by pressurized water jets

Army Materiel Development and Readiness Command, Alexandria, VA.

Jan 83 (D)

A report of the U.S. Army Armament Research and Development Command discusses the technology of water-jet impact cleaning. Although it is presented as a proposal for assessing cleaning technology with emphasis on the decontamination of military vehicles, the information has potential widespread application in industrial cleaning, commercial carwashing, building and street maintenance, and chemical-spill decontamination. The state-of-the-art of cleaning with high-pressure water is surveyed, including current equipment and general principles affecting operation.

FOR ADDITIONAL INFORMATION: You can learn more details about this technology by ordering the NTIS report AD-A101266, price code A05 or contact project officer D. A. Summers (301)278-3677.

0574 Improved Electrodeposition of Chromium

Coatings: Hardness, strength, and cathode efficiency are maximized

Army Materiel Development and Readiness Command,
Alexandria, VA.

Oct 83 (G, H)

The low-contraction (LC) chromium plating process has been upgraded by optimizing plating parameters and adding electroactive chemicals to the plating solutions. The study to improve plating techniques was conducted by the U.S. Army Armament Research and Development Command. Previous work with LC chromium - which is a softer, crack-free variety of electrodeposited chromium used for corrosion protection - has led to encouraging but inconsistent results. Results of tensile tests (see figure) indicated that the aged solutions with 10 g/l V2O5 gave the highest improvement.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A118678, price code: A02 or contact project office Edward S. Chen (518) 066-5048.

0575 Improved Tube-Straightening Equipment: Digital displacement readout increases precision and speeds work

Army Materiel Development and Readiness Command,
Alexandria, VA.

Sep 83 (F, G)

Gun tubes are straightened faster and more reliably with the help of digital deflection-measuring equipment, according to a report of the U.S. Army Armament Research and Development Command. The digitally assisted system is by no means limited to gun tubes, but can be applied to numerous manufacturing processes requiring parts to be straightened. In the new technique, the ram position is measured by a fine-scale-and-reading-head system with a panel digital display. It is less tedious and time consuming to operate.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A119651, price code: A02 or contact project officer C.H. LaRoss (518) 266-5737.

0576 Induction Heating of Large Steel Cylinders:

Theoretical and practical considerations are discussed

Army Materiel Development and Readiness Command,
Alexandria, VA.

Oct 83 (G)

The induction heating of large, generally-cylindrical steel objects is discussed in a report of the U.S. Army Armament Research and Development Command. Although concerned primarily with a production system now used to heat rotary-forging preforms, the report is also useful as a guide for designing other induction-heating equipment. The report introduces the reader to the physical principles of eddy-current resistance (induction) heating, with emphasis on the problems specific to the heating of steels.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: A03 or contact project officer David Concordia (518) 266-5703.

0577 Inexpensive Bolt-Load Gage: A simple screw-and-washer strain gage indicates the optimum torque on bolts and studs

National Aeronautics and Space Administration,
Washington, DC.

Sep 83 (F, K)

A 'built-in' gage determines whether a large bolt or stud has been torqued to the desired load and also provides for continuous inspection to ensure that proper load is being maintained. The gage, a simple screw-and-washer combination, detects the longitudinal stress/strain on the bolt; it requires no electronic or sonic test equipment. The strain gage is based on setting and maintaining a maximum longitudinal 'stretch' that the bolt or stud should have under the desired load or stress. This 'stretch' can be either calculated or determined by calibration.

FOR ADDITIONAL INFORMATION: Contact: Director Technology Transfer Division, P.O. Box 8757, BWI Airport MD 21240; (301) 621-0100, extension 241. Refer to LAR-12774.

0578 Inserts Automatically Lubricate Ball Bearings: Small Inserts in the ball pockets provide a steady supply of lubricant

National Aeronautics and Space Administration,
Washington, DC.

Nov 83 (F)

Inserts on the ball-separator ring of ball bearings will provide a continuous film of lubricant on the ball surfaces. Developed for hard-to-lubricate turbo-pumps for cryogenic liquids, the yet-to-be-tested technique could be utilized on equipment for which maintenance is often poor and lubrication interval is uncertain -- household appliances, automobiles, and marine engines, for example. The inserts are made from a material high in molybdenum disulfide and poly(tetrafluoroethylene) content -- both solid lubricating agents.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB83-925611, price E02.

0579 Internal Shear-Forging Process for Aluminum: Significant cost savings are projected

Army Materiel Development and Readiness Command,
Alexandria, VA.

Dec 83 (G)

A process for manufacturing internal stiffening rings inside cylindrical aluminum shells involves a combination of internal shear forging and cold thermomechanical treatment (TMT). Preliminary development of the process was conducted for the U.S. Army Missile Command. The advantages of the process over the conventional method of welding together the cylindrical outer skin and a series of stiffening rings include reductions in cost and the possibility of enhancing structural performance by TMT. Development of the process for aluminum (2014 alloy) structures included tooling design and fabrication, an exploratory study of basic parameters, internal shear-forging experiments, processing of deliverable parts with thermomechanical treatment, tensile-property determination, and an economic analysis.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A102848, price

code: A06 or contact project officer John H. Honeycutt (205) 876-1074.

0580 Ion Implantation or Sputtering of Insulators: Methods for neutralizing an ion beam directed on an insulating-target material permits uniform ion implantation or sputtering

Department of Energy, Washington, DC.

Nov 83 (G)

A recently developed apparatus performs successful ion implantation or sputtering on electrical-insulator targets. The ion bombardment of electric insulators - such as sapphire, silica, magnesia, and the like - has been difficult because of the localized repelling-charge accumulation at the insulator surface. The apparatus incorporates an ac source connected to an electron-emitter filament. By varying the current input to the filament, the operator controls the temperature to which the filament is heated and hence its electron emissivity.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based U.S. Patent 4,278,890, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1. For licensing information contact: Office of Assistant General Counsel for Patents, US DOE, Washington, DC 20585.

0581 Jig Quickly Checks Connector-Pin Alinement: Special jig reduces test time from hours to minutes

National Aeronautics and Space Administration, Washington, DC.

Dec 83 (B, K)

A test jig checks whether the pins of a connector are within location tolerance. The jig greatly reduces test time. For a 250-pin connector, for example, a test that takes only 5 minutes with the jig requires 4 hours with a toolmaker's microscope--the conventional way of checking pin location. The jig is a metal plate that makes electrical contact with out-of-tolerance pins but not with pins that are within tolerance. Jigs can be designed to accommodate a variety of pin patterns and shapes. With chemical milling or laser drilling, extremely-precise hole patterns can be created in stainless-steel sheets only 0.010 to 0.020 inch thick. Such templates could be mounted in general-purpose fixtures for checking pin alinement to close tolerances.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20237/TN.

Laser Flaw-Detection System: Proposed system offers speed and flexibility for production-line testing

See 0460

0582 Light, Compact Pumper for Harbor Fires: Aerospace technology is utilized in a transportable, powerful unit

National Aeronautics and Space Administration, Washington, DC.

Oct 83 (D)

A recent report describes the development of a new transportable water-pumping unit for firefighting. The compact, self-contained unit provides fire protection at coastal and inland ports and is lighter than a standard firetruck pumper of the same capacity. Incorporating aerospace technology and materials, the unit is a skid-mounted gas turbine and pump that delivers up to 2,4000 gal/min of water at a discharge pressure of 150 lb/in². The water source can be any open stretch of freshwater or saltwater or a high-capacity fire hydrant.

The unit primes itself and can draft water to a height up to 20 feet. The unit can be operated from a riverbank, light truck, trailer, dock, barge, or boat. It can be transported by truck, trailer, boat, forklift, or helicopter. It can be used to fight fires in harbors, cities, forests, refineries, chemical plants, and offshore drilling platforms. Other possible applications include cleaning up oilspills, pumping out ships, and flood-control pumping.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for the commercial use of the invention described in the report should be addressed to the Patent Counsel, Marshall Space Flight Center, Refer to MFS-25784/TN.

0583 Lightweight Shield for Centrifuge: Laminated aluminum supplants heavy metal construction

National Aeronautics and Space Administration, Washington, DC.

Mar 83 (F)

A centrifuge bowl composed of laminated aluminum offers the required combination of high strength at reduced weight. Around the outside wall of the bowl core of 1/16-inch-thick (1.6 mm-thick) spun aluminum are wrapped two layers of aluminum, each also one-sixteenth inch thick. The layered structure prevents cracks from propagating through the wall.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to MSC-18995/TN.

0584 Lock for Gantry Trolley: Safety device secures load while the gantry is being transported

National Aeronautics and Space Administration, Washington, DC.

Jan 83 (F)

The hoist trolley on a gantry can be locked in place by a simple hand-operated brake. The brake prevents the trolley and its load from moving along the gantry 1-beam track when the gantry is moved. The trolley can be unlocked, moved, and relocked by an operator on the ground. No ladders are needed. The 1-beam track can be as much as 20 feet above the ground.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer, P.O. Box 8757, BWI Airport, MD 21240. Refer to MSC-20092.

0585 Locking Nut and Bolt: Threaded fastener resists strong loosening forces

National Aeronautics and Space Administration, Washington, DC.

Nov 83 (F)

A new threaded fastener locks parts securely together despite large loosening torques, even under conditions of high temperature and vibration. The positive locking action is suitable for use where conventional fasteners tend to work loose - for example, on high-speed rotating machinery. The fastener consists of a bolt, a key, and a nut containing an inner annulus.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB83-925611, price code E02.

0586 Long-Life/Low-Power Ion-Gun Cathode: Hollow tungsten cathode, tipped with barium oxide, gives copious electron emission at low temperature

National Aeronautics and Space Administration, Washington, DC.

Mar 83 (B)

An improved cathode for ion-implantation guns has a substantially longer life than those used in the past -- approximately 1,000 hours instead of 20 -- and requires less heater power (30 watts instead of 300). It has the form of a hollow tube through which the gas enters a region of high electron density, produced by an electric discharge with an auxiliary electrode referred to as the 'keeper'. A feature of this new structure is that there is room within the anode chamber for a second cathode and an ionizable gas inlet. This may make it possible to obtain even longer lifetime for the ion-implantation device.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15328/TN.

0587 Low-Speed Control for Automatic Welding: A simple module extends the speed range to lower-than-normal values

National Aeronautics and Space Administration, Washington, DC.

Feb 83 (B, F)

An amplifier module allows the rotating positioner of an automatic welding machine to operate at speeds below its normal range. The low speeds are precisely regulated by a servo-mechanism just as are the normal-range speeds. The addition of the module to a standard welding machine makes it unnecessary to purchase new equipment for low-speed welding.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB83-925602, price code E02.

0588 Machining Stepthreads Efficiently: Special-purpose machine reduces cutting time drastically

Army Materiel Development and Readiness Command, Alexandria, VA.

Mar 83 (F, G)

A new machine cuts stepthreads much faster than previously possible. The equipment reduces cutting time from 13 to 4 h while producing better thread finishes and more accurate dimensions. The new machine is described in report prepared by the U.S. Army Armament Research and Development Command. A stepthread is a continuous thread cut at two different diameters on the same part. The threading tool on the new stepthreader is a full-form tool having all the teeth required to finish one complete sector. The machine oscillates the tool like a washing-machine agitator, machining one sector before moving on the next sector.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A088535, price code: A02 or contact project officer C.H. Rose (518) 266-5611.

0589 Machnozzle Fabric Predryer: Device operates effectively and economically

Department of Energy, Washington, DC.

Nov 83 (D, F, G)

A Machnozzle for the predrying of fabrics in production has been successfully demonstrated on a commercial scale. The energy efficiency of the Machnozzle system proved superior to that of earlier, purely thermal systems (e.g., steam cans). Steam enters the Machnozzle through a pipe at a relatively low speed until it reaches the round buffer chamber near the tip. The steam accelerates as it leaves the buffer chamber through a converging nozzle. If the steam pressure is sufficiently high, a sonic flow is produced at the exit slit. As the fabric slides past the slit, the steam blows water out of the fabric. Lint and other impurities are also removed. Compressed air could be used in place of steam, but steam confers an additional advantage.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE-82010892, price code: A07.

0590 Magnetic Bearings Would Increase Pump Efficiency: Active feedback applied to the bearing windings compensate for unbalanced forces

National Aeronautics and Space Administration, Washington, DC.

Jul 83 (F)

Magnetic bearings would make a two-element rotary pump more efficient, according to a new proposal. In the concept developed at Goddard Space Flight Center, active feedback applied to the bearing windings would compensate for rotor displacements. The result would be lower friction and less backflow. In the proposed compressor counterrotating tapered screws force the gas through a tapered chamber, decreasing the gas volume until it discharges at higher pressure from the exit port. This pump could be used to compress fluids or gases in a mechanical refrigerator. Other types of counterrotating machinery may also use magnetic bearings and motors to maintain close clearance between rotating parts.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: GSC-12668.

0591 Magnetic-Gear Concept for Special Applications: Low-torque, noncontacting gears may be useful in special environments

National Aeronautics and Space Administration, Washington, DC.

Jan 83 (F)

A proposed gear would have magnetic instead of mechanical teeth. Conventional stamped, machined, forged, or molded gears are replaced by inexpensive smooth gear blanks of permanent-magnet material. A pattern of alternating poles is magnetized into the material, with pole spacing equal to that of the equivalent mechanical gear teeth. The pole pattern can be helical or straight, as in ordinary gears. Magnetic gears might be useful in the following applications: Where torque requirements are very low; Where a detent action is required; Where the environment (for example, vacuum or extreme temperatures) is hostile to ordinary gear lubricants; In a vacuum, where conventional gears might tend to cold-weld to each other; or Where speeds are extremely high.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer, P.O. Box 8757, BWI Airport, MD 21240 or for inquiries concerning rights for the Commercial use of this invention, contact the Patent Counsel, Johnson Space Ctr.,

Mail Code AL-3, Houston, TX 77058. In both cases refer to MSC-20132/TN.

Making Airfoils From Braided Composites: Improvements Include lower cost and increased resistance to damage
See 0017

Manufacturing Porous Stainless-Steel Nose Tips: Sintering conditions are chosen to obtain the required gas permeability
See 0721

0592 Manufacturing Thick-Film Crystal Oscillators: Production operations, including inspections, are described in detail

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 (B, G)

A document describes the production of high-density thick-film circuits for crystal oscillators. Manufacturing flow charts and manufacturing testing and quality-control procedures are presented. Equipment, materials, and procedures related to various significant process steps are defined. The document was prepared for the U.S. Army Electronics Research and Development Command. Although the manufactured devices share many of the standard procedures for thick-film hybrid circuits, a large proportion of the process and techniques reflects the unique requirements of the application. Procedures from initial cleaning of the ceramic substrate to shipment of the assembled voltage-controlled crystal oscillator are covered.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A086344, price code: A11.

0593 Meniscus Imaging for Crystal-Growth Control: Anamorphic imaging and adjustable contrast help to monitor growth conditions

National Aeronautics and Space Administration, Washington, DC.

Nov 83 (H, J)

Silicon crystal growth is monitored by a new video system that reduces operator stress and improves the conditions for observation and control of the growing process. The system optics produce greater magnification vertically than horizontally, so the entire meniscus and melt is viewed with high resolution in both the width and height dimensions. The monitoring system can be used for many different crystal-growth processes and in particular for the capillary-die process illustrated in the figure. Here a silicon ribbon crystal is grown for use in solar cells. The size of the ribbon is affected by the pulling speed and growth-interface temperature.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15349/TN.

Method and Article of Manufacturing an Optical Fiber Connector

See 0171

Micrometer for Measuring Trepanned Grooves: Tool accurately measures groove diameter where standard callipers are not feasible

See 0469

0594 Modified Reamer Removes Chips and Contaminants: A proposed tool would prevent chips and lubricant from contaminating the cutting area
Army Materiel Development and Readiness Command, Alexandria, VA.

Apr 83 (F)

A proposed modification to a reamer would draw cutting chips and lubricant away from the cutting area. The tool would be especially useful when the surroundings must be kept free from contamination. The modified reamer has an internal passage connected to a vacuum source. Cuttings are drawn into the passage through holes in the reamer grooves. The exit the shaft through outlet holes that lead into vacuum manifold.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div., P.O. Box 8757, BWI Airport, MD 21240. Refer to MFS-19711/TN.

0595 Modified Silicon Furnace Lowers Crystal Cost: Functional changes reduce cycle time and prolong crucible life

National Aeronautics and Space Administration, Washington, DC.

May 83 (D, G, H)

A modified Czochralski setup grows several large crystals in succession from one crucible. Previously, the crucible would be destroyed by thermal contraction differences during the cool-down phase and would have to be replaced after each crystal was completed. The modified apparatus is expected to reduce the cost per crystal by about 50 percent. Operation of the modified furnace has demonstrated that high-quality crystals can be grown from at least three successive melts.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15041/TN.

0596 Modified Tools Improve Composite Machining: Machining problems encountered with certain laminates are eliminated

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (F, G)

Kevlar, or equivalent, laminates tend to fuzz when they are machined with conventional tools. A study by the U.S. Army Aviation Research and Development Command shows that this problem can be eliminated by using special and modified tools. The improved machining is due to the elimination of chip-packing and heat-buildup which leads to cleaner cutting. Water, applied either as a fine spray or a dip is adequate for cooling. Packing is eliminated by modifying drill bits to cut material toward the center. A standard carbide-tipped circular saw is sufficient for most applications. The water-jet cutter is one cutting tool which gave superior results. The cutter was easily able to cut through the laminate 0.38 in. thick and appeared to have the capability of working on much thicker material. The status of near and far term automated-fabrication lines was reviewed.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A117853, price code: A04 or contact project officer H. Reddick (804) 878-2975.

0597 New 3-D Robot Vision System

Department of the Air Force, Washington, DC.
Dec 83 (A, F, G)

The U.S. Air Force is investing significant resources into enhancement of computer-aided design (CAD) and computer-aided manufacturing (CAM) technologies. A significant shortfall in this area is research into computer-aided inspecting, where technology is advancing much more slowly. The USAF School of Aerospace Medicine has developed a 3-D robot vision system which can provide eyes for the other blind robotics. The system does 3-D mapping with immediate quantitative x, y, z coordinates (16000 or more in seconds) and thereby provides a mathematical spatial description of any object in the field of view, even when the system or the operator has no a priori data on the object. This mathematical description can then drive CAD or CAM robots, thereby closing the loop and permitting fully self-sufficient robotics systems for design, manufacture, inspection, etc. A laboratory model has been developed and a near real-time demonstration has been conducted. Diagnostic use in medical areas is profound. Since 3-D numerical data is provided, anatomic structures could be fabricated by automated fabrication devices on demand. Thus skeletal structures, internal prostheses, etc., may be constructed. Brain ventricles, fractures, tumors, circulatory structures, maxillofacial areas, etc., may be visualized in 3-D with multiple perspective rotation. Three patents have been granted: Dental X-Ray Alignment System, No. 4012638, Optical Surface Topography Mapping System No. 4070683, and Topographic Comparator No. 4294544. Other patents are under consideration.

FOR ADDITIONAL INFORMATION: Contact: Lt. Col. Bruce R. Altschuler, Avionics Laboratory/AAAT, Wright-Patterson AFB, OH 45433, (513) 255-4594.

0598 Nitrogen-Based Carburizing Atmosphere: Energy savings and production increases are possible with a nitrogen/methanol atmosphere for heat treatment of steel

Department of Energy, Washington, DC.
Feb 83 (G, H)

A series of case studies demonstrates that a nitrogen/methanol atmosphere duplicating endothermic composition in the carburizing of ferrous alloys saves from 5 to 19 percent of the energy consumed in the carburizing process and that production increases by about 10 percent.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-004196, price code: A07 or for information not provided in the report, contact Richard A. Wilde, USDOE, Idaho Operations Office, 550 Second St, Idaho Falls, ID 83401; (208) 526-1807.

0599 Optical Sensor for Robotics: Optical pattern yields orientation and distance of objects as they approach

National Aeronautics and Space Administration, Washington, DC.
Oct 83 (B, J)

An optical method for precisely docking a spacecraft and a satellite promises to be useful in terrestrial applications, such as the control of robot movements in manufacturing. The reflections of a laser beam from patterns on the satellite yield information on the radial misalignment, angle between axes, and range. An optical transmitter/receiver on the spacecraft projects the laser beam on the satellite. A mechanism moves the beam direction in a cone, so that

the light beam scans the target in a circular or an elliptical pattern. The optical system adjusts the scanning-cone angle so that the ratio of maximum to minimum power from the target rings equals a preset value.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240 (301) 621-0100 Ext. 241. Refer to MFS-25713.

0600 Optical-Fiber-Cable Manufacturing Development: Cable design, processing steps, and equipment are described

Army Materiel Development and Readiness Command, Alexandria, VA.
Aug 83 (G, H)

Progress in the development of processes to manufacture rugged optical-fiber cables is outlined in a report by the U.S. Army Communications Research and Development Command. Topics include the selection of an optimal fiber-and-cable design; the manufacturing processes, equipment, and tooling; and equipment for testing fibers and cables. The eventual program objective is the automated manufacture of cables of six polymerclad glass light-conducting cores surrounded by a polyurethane jacket, a layer of polyester reinforcing strands, and a polyurethane outer jacket.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A086 706, price code: A04 or contact project officer Robert Kopstein (201) 532-7009.

0601 Oxidation-Strengthened High-Temperature Rivets: Shear strength of titanium-niobium rivets improves with oxidation

National Aeronautics and Space Administration, Washington, DC.
May 83 (F, H)

Titanium-niobium rivets are stronger when their surfaces are oxidized. Rivets composed of a 55-percent Ti/45-percent Nb alloy that had been oxidized at 1,700F for 10 hours were stronger -- both at room temperature and at 1,700C -- than unoxidized rivets of the same composition. The Ti-Nb rivets may be suitable for high-temperature applications in oxidizing environments -- for example, in the burner cans of commercial jet engines and boilers and retorts for coal gasification systems.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0199. Refer to: MSC-20095/TN.

0602 Padded Allen Wrench Grips Fastener: Screws can be inserted in hard to reach places

National Aeronautics and Space Administration, Washington, DC.
Sep 83 (F)

The addition of a PTFE pressure pad increases the utility of a hexagonal socket wrench. The pad presses against opposing inside socket walls, causing a frictional force that retains a socket-head screw against gravitational and handling forces. Developed for spacecraft repairs, the tool is useful wherever there is a possibility of losing the screw due to awkward working conditions or wherever a tight clearance prevents the insertion or removal of the screw by hand. Unlike magnetic tools, the new device works with socket-head capscrews of both nonferrous and ferrous materials. Since PTFE is relatively unaffected by gases, oils, or

temperature extremes, the tool can be used in a wide variety of environments working conditions.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for the commercial use of this invention should be addressed to Leon D. Wofford, Jr. George C. Marshall Space Flight Center, Mail Code CC01, Marshall Space Flight Center, AL 35812; (205)453-0020. In either case Refer to MFS-25739.

0603 Pellet Feed for Dendritic-Web Growth: Silicon pellets automatically added to the crucible would sustain crystal growth for days

National Aeronautics and Space Administration, Washington, DC.

Apr 83 (C, G, H)

A technique for replenishing the silicon melt during the growth of a continuous dendritic web would permit uninterrupted crystal growth for several days or longer. In dendritic-web growth, a crystal ribbon is formed by freezing a liquid supported on each edge by a needlelike dendritic crystal. The growth is thus shaped by crystallographic forces and surface tension rather than by dies.

FOR ADDITIONAL INFORMATION: Contact: Director, Technology Transfer Div., P.O. Box 8757, BWI Airport, MD 21240. Refer to NPO-15198/TN.

0604 Photoflash Powders Desensitized by Coatlants: A safe blending of photoflash powders uses simple and readily available equipment

Army Materiel Development and Readiness Command, Alexandria, VA.

Jan 83 (H)

A method of contact coating photoflash compositions from a wet medium employs electrically-conducting carbon black as a coatant in a countercurrent mix miller. The procedure, developed by the U.S. Army Armament Research and Development Command, is safer than the standard methods because the material remains wet or damp throughout the blending process.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report order number: AD-A094754, price code: A03 or contact project officer Steve Dallman (201)328-2160.

Plating to Reinforce Welded Joints: Electrodeposition of nickel is used to reinforce or strengthen weld joints

See 0734

0605 Portable Pipe Wrapper: Device controls tension and wrap angle

National Aeronautics and Space Administration, Washington, DC.

Oct 83 (F)

A new tool applies fragile layered insulation to cryogenic tubing. It has been used routinely to apply two layers of fiberglass and one of aluminum foil on pipe used as the inner line in vacuum jacketed cryogenic plumbing applying the layers one at a time by hand had proved to be too delicate and time consuming a task: The insulation tended to tear when handled with gloves (required to avoid contamination), and the layers were difficult to apply uniformly. The new portable pipe wrapper has three freely revolving drums that hold the wrapping material. The pipe is held in a turntable that turns like a lathe. As the pipe turns, it pulls the wrappings off the rolls and onto the pipe in tight, even

layers. The wrapper is easy to use and is made from inexpensive, readily available parts.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB83-925610, price code E02.

0606 Powder Forging of Large Gears: A proposed combination of powder forging with isothermal forging can produce near-net-shape gears

Army Materiel Development and Readiness Command, Alexandria, VA.

Jul 83 (G)

A study for the U.S. Army Tank Automotive Research and Development Command examined the isothermal forging of steel-powder parts as an economical method of producing near-net-shaped gears with plan areas larger than 100 sq. in. Details were worked out how to produce a final drive gear. The proposed process consists of: (a) Blending graphite with cold, compactible steel powder; (b) Compacting the loose powder into a preform shape; (c) Sintering the preform at an elevated temperature and in a reducing atmosphere; (d) Isothermally forging the sintered preform to full density and near-net shape; and (e) Finish machining, heating, and inspecting the part.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A092879, price code: A02 or contact, project officer D.T. Ostberg, (313) 574-6065.

0607 Powder-Metallurgy Steel Forgings: Complex configurations are precision forged with a minimum of secondary machining operations

Army Materiel Development and Readiness Command, Alexandria, VA.

Mar 83 (G, H)

The U.S. Armament Research and Development Command has used powder-metallurgy (P/M) steel forgings to manufacture high-performance weapon components. The procedure combines the advantages of fabricating net or near-net shape parts with strength achieved by forging. Excellent properties were achieved in both the transverse and longitudinal directions, being superior to wrought-iron material in the transverse direction and comparable to wrought iron in the longitudinal direction. The P/M process can be used to precision forge a complex configuration with a minimum of secondary machining operations.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A090379, price code: A02 or contact project officer Andrew Crowson (201) 328-2596.

0608 Precision Deburring of Miniature Parts: Numerical-control machining is precise enough for some geometries, the robots, however, need more development

Department of Energy, Washington, DC.

Jul 83 (F, G)

An evaluation of the precision deburring of miniature parts answers a number of questions about what equipment is available and what it can do. About 50 manufacturers sell equipment for mechanized deburring, most of which is designed for larger parts. Many precision miniature parts are still deburred mostly by hand--a time-consuming and fre-

quently imprecise process. An examination of numerical-control (NC) machines and robots, however, shows that deburring can be mechanized to deal at least with some parts geometries.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: BDX-613-2431, price code: A05.

0609 Precision Hand Deburring: A training manual teaches how to deburr parts, particularly precision miniature parts

Department of Energy, Washington, DC.

Jul 83 (G)

A four-volume training manual teaches how to remove burrs from precision miniature parts. The manual is written to be self-teaching and is intended to be used for 2 hours of training each day and another 6 hours of benchwork in deburring. It is organized into 44 sections, with most sections designed to be covered in a 2-hour presentation. The manual addresses trainees who know very little about machining, inspection needs, or deburring.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order numbers: BDX-613-2400, BDX-613-2534, BDX-613-2572, and BDX-613-2582, price codes: A09, A10, A10, and A09.

0610 Precision Machining of Optical Components: Metal flats, spherics, and aspherics for infrared and laser systems may be manufactured economically by milling

Army Materiel Development and Readiness Command, Alexandria, VA.

Jan 83 (G)

Cost-effective commercial manufacture of high-energy laser and infrared optics is discussed in a report prepared under a manufacturing methods and technology project. The machines proposed for manufacturing flat surfaces, including polygon scan mirrors, are vertical spindle milling machines with a rotating tool head containing diamond tool bits.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report order number: AD-A099322, price code: A05 or contact project officer William Friday (205)876-1607.

0611 Pressure Relief Valve: A cap with O-ring protects subatmospheric systems

National Aeronautics and Space Administration, Washington, DC.

Apr 83 (F)

Many ordinary pressure relief valves used to protect subatmospheric instruments are very prone to leak, especially over extended periods of time. Some occasionally fail to function after long periods of use. A very simple design has been found to solve these problems. No failures have been seen after several years of test use. A body or housing is attached by a standard screw fitting to the piping circuit. The top surface of the housing has a machined groove in which is placed an O-ring.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div., P.O. Box 8757, BWI Airport, MD 21240. Refer to LEW-13800/TN.

0612 Preventing Freezeup in Silicon Ribbon Growth: Profiled heat extractor prevents ribbon ends from solidifying prematurely

National Aeronautics and Space Administration, Washington, DC.

Oct 83 (C, G, H)

A carefully-shaped heat conductor helps to control the thermal gradients that are crucial to the growth of single-crystal silicon sheets for solar cells. In older systems with poor temperature-gradient control operating near the freezing point, the ribbon often solidifies prematurely, freezing to the die at its ends. The ribbon breaks and must be restarted. Now, however, a 'cold shoe' with contours that are specially shaped promises to solve the freezing problem. The cold shoe, which extracts heat from the ribbon as it emerges from the die thus affords a further means of controlling the die-top temperature, in addition to the active control provided by die heaters and the passive control provided by the shape of the die itself.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15294/TN.

Process for Making Silicon Carbide Shapes: Uniform samples with submicron pore size have been produced
See 0739

Process Sprays Uniform Plasma Coatings: Multicomponent plasma coatings are applied without the segregation of components
See 0740

Process Yields Strong, Void-Free Laminates: An accurate, reproducible fabrication process produces composites of consistent quality
See 0741

Producing Ruggedized Fiber-Optic Cable: Fabrication progress and test results are reported
See 0175

Production of Microwave Acoustic Delay Lines: Improved design provides wider tolerances for production process parameters
See 0274

0613 Programable Plasma-Spray System: Optics and microprocessor control combine in a versatile plasma-spray apparatus

National Aeronautics and Space Administration, Washington, DC.

Jan 83 (G, H)

A wide variety of metal coating systems have been in commercial use for a number of years. Specific coatings and application processes can impart a wide range of beneficial characteristics to metal surfaces. One of the more versatile of the coating systems uses either metallic or high-temperature nonmetallic powders. These powders are applied with a high-temperature plasma arc system. Two major problems in the plasma-spray operation are that it is labor-intensive and that it is difficult to reproduce coating thickness and contours exactly. It is also difficult for the operator to vary coating chemistries and densities in a controlled and reproducible manner. Research has led to the development of an automated plasma-spray system that is both programable and reproducible. This system utilizes standard plasma-spray equipment along with a noncoherent light-measuring system and a microprocessor.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report order number: NASA-CR-165418, price code: A07.

0614 Quick-Connect, Self-Alining Latch: Sturdy latch tolerates 10 deg of angular mismatch in joining structural elements

National Aeronautics and Space Administration, Washington, DC.

May 83 (F)

A latch originally developed for joining two spacecraft in orbit holds securely, yet connects and disconnects quickly. The latch has possible uses as a pipe joint, as a connector for the parts of portable structures, and as a fitting for marine risers on offshore drilling rigs. The passive half of the latch consists of a simple hexagonal frame containing three alinement grooves on its face. Three slanting triangular plates guide the passive frame to its nested position in the active frame.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20205/TN.

0615 Quick-Disconnect Fastener: A proposed fastener would have good shear-and moment-load-carrying capacity

National Aeronautics and Space Administration, Washington, DC.

Sep 83 (F, G)

A proposed quick-disconnect fastener for two or more parts resists shear loads and torque. It would center the part to be joined, clamp them, and then tighten them into a single unit. Potential applications for the removable fastener include holding parts for welding, brazing, soldering, riveting, and gluing. Other possible uses would be for attaching removable panels and panels with poor access on one side and for plugging leaks in pressure vessels. The fastener consists of a spring-loaded hexagonal actuating pin, six springy collet fingers, and a hexagonal nut locking collar.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: LAR-12895.

Real-Time Radiographic Inspection System: An advanced fluoroscopic system enables X-ray inspection in high-volume production

See 0489

0616 Recrystallizing Short Lengths of Silicon Ribbon: Techniques are proposed for the efficient use of short substrates

National Aeronautics and Space Administration, Washington, DC.

Jan 83 (G, H)

A short ribbon of polycrystalline silicon can be restructured to large single-crystal grains by moving it through a heating zone where a narrow transverse section is melted. As that section of ribbon moves out of the melting region, the atoms of refreezing silicon build a regular crystal pattern. In the past, long ribbons have been used in the regrowth process, but the technique can be applied advantageously to short lengths as well. In the arrangement for regrowth, the ribbon moves (on rollers) through a preheating furnace, then past laser beams that produce the narrow molten zone, and finally through a postheating furnace.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div., P.O. Box 8757, BWI Airport, MD 21240. Refer to NPO-14916.

0617 Recycling Cannons by Rotary Forging: Material is conserved, and money is saved

Army Materiel Development and Readiness Command, Alexandria, VA.

Oct 83 (G)

Scrap gun tubes were recycled into smaller gun tubes by rotary forging in experiments conducted by the U.S. Army Armament Research and Development Command. Using the old tubes is less expensive than remelting or otherwise producing new preforms for forging. The saving per preform is greater than \$2,000 in some cases. Similar savings can be realized by other manufacturers of parts for powerplants, ships, and industrial machinery. With the help of a computer, different sizes and types of gun tubes were compared for the amount of material, cross-sectional area ratios, design dimensions, and forging preform-dimensional requirements.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number AD-A119677 price code: A03 or contact project officer C. Calderone (309) 794-4044.

0618 Redundant Gear Train: Tandem harmonic drives are immune to single-point failure

National Aeronautics and Space Administration, Washington, DC.

Aug 83 (D, F)

Simply duplicating the motor and gears does not significantly improve the reliability of a mechanical drive train. There is always the possibility of a single-point failure, in which a failure in one drive path jams the other drive path as well. Now, however, an arrangement of two harmonic drive mechanisms offers true redundancy. One mechanism continues transmitting power regardless of how the other fails. Besides being highly reliable, the dual harmonic drive is compact, occupying a smaller volume than a conventional gear train for the same power and speed reduction. This drive train can also be designed to be 'backdrivable' to the condition in which a torque applied at the output shaft of a nonoperating electromechanical drive will cause rotation of the unit input shaft and motor.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15317.

0619 Regulating Oxygen Pressure Safety: Sudden heating is avoided when the regulator is turned on

National Aeronautics and Space Administration, Washington, DC.

Sep 83 (F)

A pressure regulator for oxygen allows gas flow to be shut off on its low-pressure (outlet) side rather than its high-pressure (inlet) side. The regulator thus avoids the fire hazard associated with the rapid pressurization and consequent adiabatic heating of oxygen on the input side when the regulator is turned on. The new regulator can reduce the danger of fire in aircraft and in medical oxygen supplies.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20300.

0620 Remote-Action Tube Crimper: Tubing could be crimped in hard-to-reach and hazardous areas

Army Materiel Development and Readiness Command, Alexandria, VA.

Apr 83 (F)

A proposed long-handled tube crimper could stop leaks or reduce fluid flow in hard-to-reach and hazardous areas. It is similar to tools for pinching off vacuum equipment and sealing it from its pumping source. The tool includes a steel plunger, which is contained within a pipe, and long cam-action handles that open and close the crimping jaw. The movable jaw is wedge shaped and the stationary jaw is cylindrical. The length of the plunger and surrounding pipe can be varied from tool to tool to accommodate the reach required.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div., P.O. Box 8757, BWI Airport, MD 21240. Refer to MSC-20197/TN.

0621 Replaceable Sleeve Protects Welder Coil: With a carbon insert, deflection coils last longer and are easier to maintain

National Aeronautics and Space Administration, Washington, DC.

Oct 83 (G, H)

A new replaceable carbon insert for the deflection coil in an electron-beam welder promises to decrease maintenance costs. Inserts made from materials other than carbon (not yet tried) may be less expensive, thus reducing costs even further. The new insert is a cylindrical sleeve machined from carbon rod. The diameter is carefully controlled to assure a snug fit in the deflection coil since carbon is non-magnetic, the sleeve does not interfere with coil operation. The sleeve is much easier to clean than are conventional protective coatings. Metal deposits are brushed away, and the sleeve is then returned to service. The carbon sleeve is in regular production use..

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240 (301) 621-1000 Ext. 241. Refer to MSC-20236.

0622 Research Progresses to Improve Corrosion Resistance of Steel Ball and Roller Bearings

Department of the Navy, Washington, DC.

Aug 83 (H)

Research is progressing to develop the application of ion implantation for the improvement of localized corrosion resistance of M50 steel bearings. Initial work showed that ion implantation of Cr into M50 bearing steel dramatically improved its corrosion resistance in CL contaminated engine oil, and that implantation did not degrade the rolling contact fatigue lifetime of the material as has been found for some coatings. Implantation produces no macroscopic dimensional changes and is applicable to otherwise finished bearings..

FOR ADDITIONAL INFORMATION: Contact E. E. Elsasser, Naval Air Propulsion Center, P.O. Box 7176, Trenton, N.J. 08628; (609) 896-5751.

0623 Resolution Limits in Electron-Beam Lithography: The target material, rather than the electron source, limits the resolution

Army Materiel Development and Readiness Command, Alexandria, VA.

Mar 83 (B)

Electron scattering by the resist and IC substrate materials imposes a fundamental limit upon the resolution of electron-beam lithography, according to a report of the U.S. Army Electronics Research and Development Command. The study was prompted by the need to know the achievable circuit density in very-high-speed IC's. It should also be of interest in other IC applications and in the fabrication of diffraction gratings or other structures that include fine lines on flat substrates. The scattering of electron beams from the two target materials was analyzed theoretically. Preliminary experiments confirmed that both of the predicted scattering phenomena degrade the resolution of lithographic lines.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A090407, price code: A02 or contact project officer Arthur Ballato (201) 544-2773.

RF Curing of Epoxy/Fiberglass Composites: Tools and process parameters were developed for this economical process

See 0748

RF Sputtering of Gold Contacts on Niobium: Low-resistance contacts are stable down to 4.2 K

See 0281

0624 Roll Forging of Compressor Blades: Blades are produced at lower cost

Army Materiel Development and Readiness Command, Alexandria, VA.

Aug 83 (F, G)

An improved process based on isothermal roll forging is used to make compressor blades for axial-flow turbine engines. The new process was developed for the U.S. Army Aviation Research and Development Command to provide a lower cost alternative for the mass production of turbine blades. The blades are made from 1/2-by 1/4-in. bars of AM-350, a precipitation-hardening stainless steel. The rough-roll-forged blanks have nearly the final airfoil cross sections, blade roots, and platforms..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A088 076, price code: A06 or contact project officer Roger Gagne (617) 923-3436.

0625 Rotating-Machinery Critical Speeds: Solutions are obtained assuming motion in one plane

National Aeronautics and Space Administration, Washington, DC.

Nov 83 (A, D, F)

A computer program provides quick, efficient, and accurate results in support of preliminary and proposed rotating-machinery designs. Advanced rotating-machinery design is an iterative process in the early stages of development. With the higher-operating-speed requirements of these flexible rotor designs, the rotor dynamic analysis becomes more important. Location of the critical speeds is not only important from a resonant-response standpoint but also for stability considerations. This new program provides timely, critical-speed calculations to support preliminary rotating-machinery designs. The analysis develops a model from data files that represents the stiffness and mass properties of the rotating assembly. This program is written in FORTRAN V for batch execution.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to MFS-19669/TN.

Saving Energy Costs in Plywood and Veneer Industries:
A handbook advises on simple, fast-payback methods
 See 0750

0626 Self-Alining, Latching Joint for Folding Structural Elements: Center joint requires no special skills or equipment

National Aeronautics and Space Administration, Washington, DC.

Mar 83 (F)

Structural column elements can be assembled quickly and easily with the aid of a new center joint. The joint alines the column elements automatically and fastens them together securely. Tapered half columns are stacked like paper cups, unfolded, and connected to other similar elements to form truss structures. Originally developed for space-erectable structures, the column elements and center joints can be assembled without special tools or by a simple remotely-operated handling device. The new center joint consists of a pair of hinged hubs. Spring-loaded locking rings are fitted around the hubs. Each locking ring is secured by a retaining ring and is held in a cocked position (in the folded state) by a latch. The new joint has potential applications: the vertical members of radio-transmission towers could be made from several short tubular elements that incorporate the joints on each end, so that the tower elements can be folded and stacked for transportation and quickly unfolded and erected onsite. If liquid or gas seals were added to the center joints, they could be used in a deployable pipeline.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Inquiries concerning rights for the commercial use of this invention should be addressed to the Patent Counsel, Langley Research Center, Mail Code: 279, Hampton, VA 23665. In both cases refer to LAR-12864.

0627 Self-Regulating Thermoelectric Refrigerator: The transition to and from the superconducting state is the regulating mechanism

Department of Energy, Washington, DC.

Jul 83 (B)

A thermoelectric refrigerator is self-stabilizing. It is composed of two superconductor materials, one of which (Nb₃Sn) has a superconducting transition temperature lower than that of the other (Nb₃Ge) and equal to the required refrigerator temperature. The materials work together to maintain their temperatures at the lower transition temperature. The regulation is fast and accurate. For example, at an 18 K transition temperature, regulation is within 0.001 K, or 1 part in 18,000.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-013594, price code: A02. For licensing information, contact: Office of Assistant General Counsel for Patents, US DOE, Washington, DC 20285.

0628 Semiautomatic Dry Filling System: Production line is safe, dependable, and economical

Army Materiel Development and Readiness Command, Alexandria, VA.

Jul 83 (D, G)

A semiautomatic prototype production line for the dry filling of white phosphorus has been provided by the modification and improvement of existing equipment. A report on the production line, prepared for the U.S. Army Chemical Systems Laboratory, describes the equipment, a test program conducted on the line, and test results. Major development work was done on the work stations involved with automatic volumetric filling. The new system reduces water and air pollution by more than 97 percent over that experienced with the previous dip/fill method.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A089981, price code: A03 or contact project officer Merlin L. Erickson, (301) 278-2170.

0629 Sequenced Drive Mechanism for Rotary Valves: Improved drive mechanisms minimizes wear or damage due to scrubbing action with the valve seat

Department of Energy, Washington, DC.

Oct 83 (F)

An improved drive mechanism for rotary valves provides for the linear disengagement of the valve element from the seat. The mechanism operates in sequence by first pulling the element linearly away from the seat, thus minimizing wear and damage to the seat, then swinging the element out of the flow path through the valve to eliminate obstruction. Mechanisms used previously for sequential rotary valves presented problems since the mechanisms relied on delicate parts and friction or wedging actions. This mechanism is further advantageous in that it allows for greater flexibility in valve configuration and actuator requirements.

FOR ADDITIONAL INFORMATION: The patent on which this technical note is based is U.S. Patent 4,288,060, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

0630 Short Shot Tower for Silicon: Passage through a cold liquid reduces the drop length for shot formation

National Aeronautics and Space Administration, Washington, DC.

Dec 83 (G, H)

The drop length necessary to convert molten silicon to shot is expected to be reduced by a proposed new process. In addition to falling through a gas, the droplets of molten silicon fall through cold liquid methanol. Both the heat-transfer coefficient and the temperature difference between the hot silicon and the cold surrounding liquid are greater than they would be for a gas. Therefore the heat of the silicon droplets is transferred more quickly, and they become hard spheres within a shorter drop distance.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15607.

0631 Silicon Sheet Quality is Improved By Meniscus Control: Automatic control ensures more uniform silicon sheets

National Aeronautics and Space Administration, Washington, DC.

Apr 83 (C, G, H)

Better-quality silicon crystals for solar cells are possible with an instrument that monitors the position of the meniscus as a sheet of solid silicon is drawn from a melt. Using

information on the meniscus height, the instrument generates a feedback signal to control the melt temperature. The instrument is intended for use with the edge-defined film-growth technique in which molten silicon rises inside a graphite capillary die.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div., P.O. Box 8757, BWI Airport, MD 21240. Refer to NPO-15384/TN.

0632 Six-Axis Electrical-Discharge Machine: Versatile machine tool is made by converting a radial drill

National Aeronautics and Space Administration, Washington, DC.

Sep 83 (F)

An electrical-discharge machine (EDM) of unusual versatility has been made by the conversion of a radial drill. The drilling head is replaced by a ram that holds and positions the electrode. A tank and recirculation system for the coolant are added. Use of the six axes of motion allows full exploitation of the principle of electrical-discharge machining. The mechanical versatility also simplifies the positioning of work fixtures, thus reducing setup time and costs. The capabilities of the machine were demonstrated in performance tests that included an overcut test, a through-hole test, a cavity test, and a small-hole test. All of these required precise machining in steel, using either copper or graphite as the electrode.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-19695.

0633 Sled Control and Safety system: Microprocessor control keeps the velocity and acceleration within safe limits

National Aeronautics and Space Administration, Washington, DC.

Jul 83 (A, F)

A computerized system for controlling the motion of a linear-track accelerator could be applied to other automated equipment, such as numerically-controlled machine tools and robot manipulators on assembly lines. The system supervises the motion and automatically shuts down if a safety hazard develops.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number NASA-CR-167425, price code: A04.

Solar-Cell Encapsulation by One-Step Lamination: Prefabricated covers are brought together with interconnected solar cells and cured in a single step

See 0383

0634 Split Gland Simplifies Tubing Connection:

Installation, removal, and maintenance are easier and less time-consuming

Department of Energy, Washington, DC.

Dec 83 (F)

A split gland can slide sideways on or off tubing. Like conventional glands, the new device is used to make leaktight connections by securing tubing with ferrules or flared ends to threaded fittings. Unlike conventional glands, the split gland does not have to be slipped on or off at the bare, unflared end of a tube. As its name implies, the split gland resembles a unitary gland that has been split in half. A horseshoe-shaped key slips over the tubing and fits into keyways in each half body to keep the threads of the halves

in axial alignment. The split gland can be installed or removed after the tubing has been bent and after the end has been flared or provided with a ferrule, a distinct advantage in case of error in installation or case the gland proves defective after assembly. The new design thus also promotes an economy of material in that the tubing does not have to be cut or scrapped every time a gland is changed.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patents, 343,496, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1. For licensing information contact: Officer of Assistant General Counsel for Patents, U.S. DOE, Washington, DC 20585.

0635 Squeeze Casting of Projectile Bodies: Sound castings can be mass-produced

Army Materiel Development and Readiness Command, Alexandria, VA.

Aug 83 (G, H)

The feasibility of squeeze casting for the production of mortar and other projectile bodies has been demonstrated in a study conducted for the U.S. Army Armament Research and Development Command. Depending upon the specific natures of other parts to be produced, squeeze casting may offer advantages in uniformity, surface finish, internal soundness, in economy of material, energy efficiency, and cost. There appear to be no insurmountable obstacles to mass production rate of 200,000 units per month.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A086 850 price code: A04 or contact project officer Duane Gustad (201) 328-2708.

0636 Squeeze-Film-Damped Spring for Turbopumps: Axial turbopump vibrations would be damped by capillary action

National Aeronautics and Space Administration, Washington, DC.

Feb 83 (D, F)

A new use for squeeze-film damping has been proposed for turbopump bearings. The damping of axial shaft vibrations may be improved with a properly-designed squeeze-film spring. In a turbopump, axial shaft vibrations or rapid axial movements occur when the engine is started or stopped. In order to prevent these vibrations from damaging the bearings, the shaft is installed with a spring to apply a specified axial bearing preload.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB83-925602, price code E02.

Status of Hybrid Microcircuit Manufacture: Report summarizes materials and assembly techniques used for making microcircuits and includes thick-film and thin-film technologies

See 0289

0637 Strength of Rewelded Inconel 718: Repeated repair welds do not affect joint strength

National Aeronautics and Space Administration, Washington, DC.

Jan 83 (H)

Inconel 718, the nickel-based alloy used extensively for high-temperature structural service, can be welded repeat-

edly without detriment to its strength. Tests show that 12 repairs on the same weld joint do not adversely affect ultimate tensile strength, yield strength, fatigue strength, metallurgical grain structures, or the ability of the weld joint to respond to postweld heat treatments. Such rewelding is often necessary in complex structures, since Inconel 718 is a difficult material - it flows only sluggishly when molten, and such defects as inclusions and incomplete fusion frequently appear. Apparently, rewelding to correct the defects does not harm the material.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer, P.O. Box 8757, BWI Airport, MD 21240, Refer to MFS-25649.

0638 System To Prepare Solar Cells for Assembly: To reduce labor, an industrial robot is used for solar-cell positioning and soldering operations

National Aeronautics and Space Administration, Washington, DC.

Jan 83 (C, G)

A microprocessor-controlled system comprising a solar-cell preparation station and an industrial robot is used to reduce labor in assembling photovoltaic solar panels. The preparation station prepares a cell for soldering; the robot picks up the cell, heats it to soldering temperature, and solders it in place as it positions the cell.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer, P.O. Box 8757, BWI Airport, MD 21240. Refer to NPO-15489.

0639 Technique for Crystal-Ribbon Growth: Ribbon is formed by pulling nearly horizontally from a shallow melt

National Aeronautics and Space Administration, Washington, DC.

May 83 (C, G, H)

In a proposal originated at NASA's Jet Propulsion Laboratory, a single-crystal ribbon of silicon or other material would be grown by pulling it at a low angle from a shallow melt. The thin monocrystalline ribbon would then be scored and broken into shapes required for the manufacture of such devices as solar cells. By pulling the crystal at a small angle, the technique prevents the overflow problem experienced with horizontal growth. It also creates a meniscus that minimizes growth defects in the main portion of the ribbon. The use of a shallow pool, prevents convection problems. Commercial use of this invention is desired.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15177/TN.

Tests on Double-Layer Metalization: Sputtered aluminum patterns on two levels are separated by an insulating oxide

See 0299

Three-Color LED Display Panel: Automatic-manufacturing process will produce 750 panels per month

See 0301

0640 Titanium Powdered Metallurgy Processing:

Production process for titanium components is cost-competitive

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (G, H)

A program aimed at reducing the cost of manufacturing titanium components had led to the investigation and develop-

ment of powered metallurgy (P/M) processes. Evaluation of the process was conducted for the U.S. Army Armament Research and Development Command. Conventional techniques involve machining the titanium parts from wrought bar stock. The evaluation of P/M processing consisted of testing regular bar samples and five titanium components.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A118064, price code: A03.

0641 Tool Blunts Cotter Pin Legs for Safety: Installation tool eliminates jagged edges on bent pin legs

National Aeronautics and Space Administration, Washington, DC.

Jan 83 (F)

Modified duckbill pliers ensure that sharp edges are eliminated on cotter pins. Developed to protect astronauts; space suits from being punctured when they are working near cotter-pinned bolts in the Space Shuttle cargo bay, the tool can also be used to prevent the bent loose ends of cotter pins from scratching workers' fingers or cutting and entangling wiring. The tool holds a cotter pin so that the user can insert it in a bolt and bends the inserted end of the pin into a loop.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer, P.O. Box 8757, BWI Airport, MD 21240. Refer to MSC-20086.

0642 Tool Preloads Screw and Applies Locknut: A special tool attaches tiles with accurately-controlled tensile loading

National Aeronautics and Space Administration, Washington, DC.

Jan 83 (F)

A special tool was developed for holding and accurately preloading an attachment screw and putting a nut on it. The screwhead is in an auger embedded in the tile, with a stack of Belleville washers serving as a spring. The body of the screw beyond the threaded portion is reduced in diameter and ends in a flattened region that can fit into a slot. Many assembly processes involve putting a nut on a screw, without having access to the head of the screw. The protruding screw is put through a hole in another piece of an assembly, and then a nut is fastened on it to hold the two parts together. To fasten the nut securely, the screw must be prevented from turning. Also, if the loading force on the screw is to be controlled, it is necessary to pull on the screw, rather than just twisting the nut to apply the load.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer, P.O. Box 8757, BWI Airport, MD 21240. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to the Patent Counsel, Johnson Space Center, Mail Code: AL-3, Houston, TX 77058. In either case refer to MSC-18791.

0643 Tool Severs Hidden Adhesive Bonds: It reaches deep into narrow crevices without damaging adjacent surfaces

National Aeronautics and Space Administration, Washington, DC.

Dec 83 (F, H)

A new tool enters a narrow gap between fragile materials and removes an adhesively bonded filler without damage to the adjacent surfaces. It reaches deep into narrow crevices

to reach hidden bond lines. The tool was originally developed to remove ceramic filler from between the Space Shuttle surface-insulation tiles. The tool has two blades that support a short length of music wire, 0.016 in. in diamter. A set of tools with blades spaced at different widths would fit a range of gaps.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB83-925612, price, code E02.

0644 Toroidal-Coil Winding Machines: New machines automatically wind coils on subminiature cores

Department of Energy, Washington, DC.

Feb 83 (F, G)

Recent developments have expanded the machine-winding technology to toroidal cores as small as 0.030 in. inside diameter. Before the advent of the new winding machines, cores smaller than 0.050 in. inside diameter had to be wound by hand. The core-drive and centering mechanism centers and automatically rotates the toroidal core during the winding operation.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-007646, price code: A03 or for information not provided, contact Howard Wallner, Jovil Manufacturing Co., Precision Road, Danbury, CT 06810.

0645 Tubing Cutter Is Activated Hydraulically: A hydraulic cutter deactivates aircraft ejection seats in rescue operations

National Aeronautics and Space Administration, Washington, DC.

Oct 83 (F)

The hydraulically powered tool severs tubing and cable in areas where accessibility is limited. The cutter jaws are attached to one end of a flexible 'gooseneck' extension and are closed by a hydraulic piston when the operator squeezes the handle grip. The jaws are released by flipping an on/off lever. The double-jawed cutters cut out a complete section of tubing. The cutter was originally intended for use by fire/crash crews to deactivate aircraft ejection seats during rescue operations. In that application, the cutter severs the pressure supply lines to the ejector. The cutter has potential as a flight-line tool and can also be useful in automobile and fire rescue work. The hydraulic tool employs a trigger-grip handle that can be operated easily with one hand.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: LAR-12786/TN.

0646 Ultra-High-Speed Metal Cutting: Study finds that generally-accepted steel-cutting rates are overly conservative

Army Materiel Development and Readiness Command, Alexandria, VA.

Oct 83 (F, G)

A report presents the results of a study of the feasibility of using ultrahigh surface speeds for metal removal in turning operations. The goal of the study was to determine the criteria for improving the productivity of turning operations in manufacturing. Results show that machining speeds can be increased significantly over current practice. The study was carried out for the U.S. Army Armament Research and Development Command. Four different grades of workpiece

steel were studied in combination with five different grades of cutting tools. A total of 800 different cutting conditions and parameters were studied. Tool-life lines, tool load, speeds, feeds, depths of cut, cutting-tool materials, and geometry were thoroughly analyzed.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A103970, price code: A14 or contact project officer Raymond F. Pohl (201) 328-2295.

0647 Ultrasonically-Bonded Fluidic Devices: Modified equipment forms laminates efficiently and economically

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 (F, G)

A document discusses modified ultrasonic metal-bonding equipment that was used to develop a new stack-assembly process for fluidic devices. Ultrasonically-activated diffusion bonding was successfully applied to aluminum laminates of different sizes (up to 1 by 1 in.) different foil thicknesses (2, 3, and 5 mils) and different numbers of layers (up to 18), in a program conducted for the U.S. Army Armament Research and Development Command. Bonds were obtained without excessive deformation with just a few seconds of ultrasonic bonding time on as-received surfaces. Special atmospheres were not needed, and the procedure could be performed on commercially-prepared etched-foil fluidic laminate stacks.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A084658, price code: A07.

0648 Underwater Epoxy Dispenser Improves Grouting Technique

Department of the Navy, Washington, DC.

Dec 83 (D, F)

Engineers at the Naval Civil Engineering Laboratory (NCEL), Port Hueneme, CA, have developed a new underwater epoxy dispenser for installing seafloor fastener systems. According to NCEL inventors, the dispenser represents an improved underwater grouting technique for divers. Seafloor fasteners are frequently used to stabilize structures underwater. The grout dispenser provides the construction diver with an efficient and reliable method for installing these fasteners. The tool is pneumatically powered at 100 psi and weighs only 7 pounds in water. The critical element of the tool is that it simultaneously mixes and dispenses two part epoxies while incorporating a self-cleaning mechanism. This feature helps overcome the problem of quick set-up times for epoxies, while ensuring prolonged clog-free operation of the tool. NCEL foresees marine applications for the new grout dispenser, including anchoring buoys, small vessels, or instrument packages. The grout dispenser is designed to aid the diver in any underwater grouting task.

FOR ADDITIONAL INFORMATION: Contact: Navy Technology Transfer Fact Sheet, Code E411, Naval Surface Weapons Center, Dahlgren, VA 22448. Refer to 080802/TN.

Underwater Structure Cleaning

See 0874

MATERIALS

0649 Values for Coal Gasification and Liquefaction: New valves are sought to withstand high temperatures and pressures, wear, and corrosion

Department of Energy, Washington, DC.

Jan 83 (F)

The Morgantown Energy Technology Center (METC) is conducting a program to develop valve technology for use in coal-conversion plants. Objectives of the program can be summarized as follows: To work with industry and Government to determine valve requirements and the capabilities of existing valves; To promote discussion and disseminate information among manufacturers, users, and testers relative to design changes and testing; To test valves; and To recommend valves to be installed in demonstration and pilot plants and to maintain a data base on valves installed.

FOR ADDITIONAL INFORMATION: Contact: William J. Ayers, Jr., Morgantown Energy Technology Center, P.O. Box 880, Morgantown, WV 26505; (304) 599-7125.

0650 Variable-Position Acoustic Levitation: Pressure amplitudes and frequencies are varied to change the equilibrium position

National Aeronautics and Space Administration, Washington, DC.

Oct 83 (D, J)

A method of acoustic levitation supports objects at positions other than the acoustic nodes. Acoustic force is varied so that it balances gravitational (or other) force, thereby maintaining an object at any position within an equilibrium range. When the acoustic frequency is the fundamental resonance of the acoustic chamber, the equilibrium range is one-fourth of the chamber length. The levitation method is applicable to containerless processing. In a levitation furnace, for example, it could be used to manipulate specimens without contacting them, perhaps moving them through a temperature gradient.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15559/TN.

0651 Vibration-Isolating Rotary Coupling: A torque-balancing flexible coupling reduces vibration in sensitive machinery

Department of Energy, Washington, DC.

Apr 83 (F)

A new flexible coupling transmits rotary motion between collinear shafts without transmitting unwanted shaft vibrations. The coupling will be especially beneficial in such fine-machining systems as diamond turning. Such systems are susceptible to small vibrations from the drive motor that are transmitted by conventional drivebelts. A driving flange transmits torque to a floating ring via two flexible belts that are connected diametrically opposite each other on the flange and on a ring. The floating ring belts that are also located diametrically opposite.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PNL-SA-6870 (Rev), price code: A02. For licensing information, contact: Office of Assistant General Counsel for Patents, US DOE, Washington, DC 20585. Refer to PATENT 4,203,33.

0652 Warm and Cold Forging of Gun Tubes: Equipment and energy are reduced

Army Materiel Development and Readiness Command, Alexandria, VA.

Oct 83 (G)

Cold and warm radial forging has been successfully used to form large gun tubes in experiments conducted by the U.S. Army Armament Research and Development Command. Previously, such tubes were produced only by hot forging and conventional machining. Cold and warm forging costs less than hot forging because the workpiece-heating requirements are reduced. The energy-saving feature may be very practical to aircraft, automotive, machine-tool, and other metal-processing industries.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A1190690, price code: A02 or contact project officer Vito Coloangelo (518) 266-5827.

Welding High-Temperature Components of Nuclear Plants: While a data base is being accumulated, the use of conservative interim design methods is recommended

See 0767

0653 Wipe Melt for InP Seed Substrate: A new combination of elements leaves a smooth high-luster surface

National Aeronautics and Space Administration, Washington, DC.

Nov 83 (J)

Indium phosphide (InP) semiconductor substrates used as seed wafers for liquid-phase epitaxy growth tend to lose excessive amounts of phosphorus from the surface during the melt-homogenization portion of the growth cycle. The erosion of the surface due to dissociation results in holes, cracks, indium (metal) spheres, and other unwanted artifacts. Methods previously used to eliminate or lessen the surface erosion include an InP cover wafer (used as a phosphorus source) and wipe melts of various elemental combinations. (A wipe melt is a liquid solution used to etch back or remove an acceptable amount of the surface and substrate material from the seed wafer. A new four-element wipe melt containing indium (In), gallium (Ga), arsenic (As), and phosphorus (P) has consistently produced an acceptable morphology.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: LAR-12912/TN.

MATERIALS

Abradable Seals for Gas Turbines: A Chem-Braze method is both reliable and economical

See 0144

Accelerated Corrosion Test for Antifreeze Compounds: Suitability of compounds is determined with minimum time and expense

See 0087

Advanced Aluminum Alloy Forged Helicopter Parts: Intermediate thermal/mechanical treatment improves alloy properties

See 0001

Alloy May Improve Durability of Dental Implants

See 0051

0654 Alternative Way of Estimating Fracture Toughness:**Slow three-point bending is used instead of impact**Army Materiel Development and Readiness Command,
Alexandria, VA.

Sep 83 (H)

The fracture toughness of some steels can apparently be estimated from load-versus-deflection curves obtained in slow three-point bending tests. This is the finding of a series of experiments conducted by the U.S. Army Armament Research and Development Command on samples of a high-strength, low-alloy steel. In the new method, the fracture toughness can be estimated from a single specimen. Thus, the test can be applied inexpensively as a quality-control measurement of fracture toughness.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A118674, price code: A02 or contact project officer John H. Underwood (518) 266-4183.

0655 Aluminum Integral-Color-Anodizing Process: Hard-coating imparts black coloring and excellent abrasion resistanceArmy Materiel Development and Readiness Command,
Alexandria, VA.

Sep 83 (G, H)

Integral color anodizing (ICA) is a room-temperature process for simultaneously dyeing and hard-coating aluminum alloy parts. An evaluation of different versions of ICA and similar processes was conducted for the U.S. Army Mobility Equipment Research and Development Command. Conventional methods employing low-temperature anodizing and a separate dyeing process result in hard coats that tend to form cracks in the oxide layer and are susceptible to thermal and environmental degradation. In processes employing ICA, color development is a function of the aluminum alloy and such organic acid electrolyte solutions as sulfophthalic or sulfosalicylic acids with various amounts of sulfuric acid used in the anodizing treatment.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A104318, price code: A02 or contact project officer Anthony Gigliotti (703) 664-4221.

0656 Analyzing Paint for Lead Content: New method is fast and convenientArmy Materiel Development and Readiness Command,
Alexandria, VA.

Oct 83 (H, J, K)

A document describes a method of analyzing oil-base paints for low-level concentrations of lead (or other elements). The method, which was developed for the U.S. Army Mobility Equipment Research and Development Command, employs direct-reading emission spectroscopy and is fast and convenient. The technique makes use of the rotating-disk-electrode system, specifically designed for the analysis of liquid samples. The samples and standards are excited in an electric arc or spark discharge. The light intensity of the discharge will vary directly with the lead content of the samples and the standards. The lead content of the unknown samples may be found by comparing their intensity values with the plotted intensity values of the standards.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by order-

ing the NTIS report, order number: AD-A104 420, price code: A02, or contact project officer Dario A. Emeric (703) 664-4221.

0657 Armor Design Based on Material Properties: A model allows the steel microstructure to be matched to the expected stressArmy Materiel Development and Readiness Command,
Alexandria, VA.

Mar 83 (H, J)

The behavior of a rolled homogeneous steel armor and a penetrator alloy is described in terms of a mathematical model in a report prepared by the U.S. Army Armament Research and Development Command. The model is based on the nucleation, growth, and coalescence of cracks and is used to study the main features of failures caused by stress waves. The report also proposes a method of designing a material to resist spallation that is based on the crack-nucleation and growth-rate equations of the model. Equations were developed to describe fractures with stress waves, the spallation of low-alloy nickel/chromium rolled steel armor, and the dependence of fracture on material parameters.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A090421, price code: A02, or contact project officer Gerald L. Moss (301) 278-6043.

0658 Austenitizing Behavior of Low Alloy Steel: A minimum temperature of 1,425F can sufficiently austenitize a low-alloy steelArmy Materiel Development and Readiness Command,
Alexandria, VA.

Jul 83 (H)

The transformation behavior of a low-alloy steel used in the fabrication of 105-mm gun tube forgings has been studied for a range of austenitizing temperatures by the U.S. Army Armament Research and Development Command. A number of these forgings did not conform to the strength and impact requirements set forth; it was suspected that the forgings were not properly austenitized.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A088540, price code: A03, or contact project officer Peter Thronton (518) 266-5319.

0659 Ballistic Energy Absorption by Fabrics: A test provides a figure of merit for comparing materialsArmy Materiel Development and Readiness Command,
Alexandria, VA.

May 83 (H, K)

A new test procedure for evaluating the ballistic resistance of fabrics for protective clothing was developed by the U.S. Army Natick Research and Development Laboratories. The procedure greatly reduces the cost and time necessary to develop reliable data on new fabrics. The procedure is based on a numerical value called the ballistic performance indicator (BPI).

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A090390, price code: A02 or contact project officer Frank Figucia (617) 653-1000.

MATERIALS

0660 Boronizing Transition-Metal Surfaces: Treated surfaces are hardened and protected against corrosion

Department of Energy, Washington, DC.

Apr 83 (G, H)

A new process chemically bonds a surface layer of boron to a transition-metal substrate. The method might be used to provide corrosion resistance for the positive-electrode current collectors of high-temperature electrochemical cells employing alkali-metal halides. Another possible use is the hardening of surfaces to withstand mechanical wear. In the new process, the coating bath contains an alkali-metal boron tetrafluoride, optionally with small amounts of other borides. In addition, the bath may contain KCl to lower the melting point. The metal substrate is immersed in the bath for about 24 hours. Lower bath temperatures are used than were used in earlier methods, so that cracking is reduced. FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-013616, price code: A02. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. DOE, Washington, DC 20585. Refer to PAT-APPL-6-297310.

0661 Brake Fluid Replacement Method: Quick conversion of hydraulic braking systems to silicone brake fluid is described

Army Materiel Development and Readiness Command, Alexandria, VA.

Dec 83 (D)

A procedure for easily replacing the polyglycol brake fluid used in hydraulic braking systems with a multipurpose silicone-based brake fluid has been developed by the U.S. Army Mobility Equipment Research and Development Command. The silicone brake fluid, which does not absorb water and exhibit the adverse effects of conventional polyglycol fluids, can be used in high- and low-temperature extremes, provides improved corrosion resistance, and can reduce maintenance costs. The new method involves the use of an intermediate solvent, 2-ethyl hexanol, to assist in the removal of the polyglycol.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A116336, price code: A04 or contact project officer Robert G. Jamison (703) 664-4325.

0662 Cement for Abradable Gas-Turbine Seals: A new chemical bonding system costs less than conventional brazing

Army Materiel Development and Readiness Command, Alexandria, VA.

Mar 83 (F, H)

A cement has been developed to attach abradable sintered-fiber-alloy seals to gasturbine shrouds of steel, titanium, and nickel-base alloys. Manufacturing and inspection methods for the new chemical bonding system were established in a program conducted for the U.S. Army Aviation Research and Development Command. The new system uses Inhibited Chem Braze (ICB), a mixture of 10 percent glycerine with a commercial Al/Cr-modified alkali silicate cement. An ICB seal can be detached by immersion for a few hours in hot, concentrated aqueous NaOH. In contrast, brazed seals must be removed by machining or grinding or both.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by order-

ing the NTIS report, order number: AD-A111692, price code: A04 or contact project officer S.T. Narsavage (301) 263-1625.

Ceramic Components for Gas Turbines: Brittle materials withstand high temperatures

See 0145

Ceramic Material as Heat Exchanger in Gas Turbines: This material withstands the severe environment of a gas-turbine engine

See 0146

Ceramic Materials for Vehicular Engines: Study reviews the ceramic technology

See 0147

0663 Ceramic-Cord Gas Seal: High-temperature gasket material seals at temperatures above 1,100C

National Aeronautics and Space Administration, Washington, DC.

Jul 83 (H)

Braided cord made of ceramic fibers can form a low-pressure gas seal for temperatures up to 1,160F. The alumina/boria/silica cord has been used as an exhaust-duct seal on the Space Shuttle orbiter. Those designing high-temperature seals may find the braided ceramic superior to asbestos in some applications. The ceramic-fiber cord is adaptable for emergency repairs, quick replacement, or permanent installation. It requires less-stringent machining tolerances than are demanded by metal or elastomeric O-rings. Typical applications might include engine exhaust ducts or hot pipes passing through firewalls.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20200.

0664 Characterization of High-Temperature Ceramics: Analysis and design methodologies are presented

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (H, K)

Characterization of brittle, high-temperature ceramic materials require both experimental and theoretical investigations of fracture mechanics, thermal and mechanical fatigue, and probabilistic aspects of brittle behavior. A program to develop and evaluate characterization procedures was conducted for the U.S. Army Materials and Mechanics Research Center. Such procedures are important for the successful application of ceramics to re-entry vehicles, rocket-propulsion systems, and high-temperature gas turbine engines. Included are descriptions and preliminary results of several test methods used to characterize experimentally the mechanical properties of hot-pressed silicon nitride and reaction-bonded silicon nitride.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A112753, price

code: A05, or contact project officer F. Baratta; (617) 923-3259.

Characterizing Fracture Topographies: Scanning electron microscope (SEM) is an indispensable tool for the positive identification of fracture modes

See 0433

Chelating Agent Assay: Method improves analysis of corrosion-removing compounds

See 0093

Chemical Vapor Deposition in a Fluidized Bed: Woven materials are coated evenly

See 0521

0665 Chromium Plating Tube Interiors: Chromium films with thicknesses of up to 1 mil have been deposited in tubes having length-to-diameter ratios of 7

Army Materiel Development and Readiness Command, Alexandria, VA.

Oct 83 (F, G, H)

A physical vapor-deposition process employing a hollow cathode-discharge source successfully plates chromium on the insides of tubes. The process, developed by the U.S. Army Armament Research and development Command, is an alternative to conventional plating methods that use electron-beam or evaporation-boat sources, which are unable to produce uniform coats inside the tubes that have large length-to-diameter ratios. The key to the new process is the hollow cathode-discharge source. It consists of three concentric tantalum cylinders. Uniform chrome coatings having excellent adhesion characteristics have been demonstrated in iron and copper tubes 25 cm long and 5 cm in diameter...

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A121 266/NAA price code: A03 or contact project officer W. F. Henshaw (301) 278-3677.

0666 Cleaning Petroleum Tankers for Potable Water Service: Conversion procedures are described

Army Materiel Development and Readiness Command, Alexandria, VA.

Oct 83 (D)

Two methods were evaluated for cleaning 5,000-gal petroleum semitrailers for hauling bulk potable water. The investigation was conducted for the U.S. Army Mobility Equipment Research and Development Command. The objectives of the study were to determine the feasibility of converting petroleum tankers to potable water transporters, to determine the quality of water stored in the tanks, and to identify any restrictions on storage time. Tests performed on stored water included chemical analyses, taste and odor evaluations, and visual observation.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A105 633 price code: A03 or contact project officer William Brewster (703) 664-4221.

0667 Clear Film Protects Against Ultraviolet Radiation:

Weather-resistant material is a copolymer of a screening agent and an acrylic resin

National Aeronautics and Space Administration, Washington, DC.

Jun 83 (H, J)

An acrylic film contains a screening agent that filters ultraviolet radiation up to 380 nanometers in wavelength but passes other components of Sunlight. The film can be used to protect such materials as rubber and plastics that are degraded by ultraviolet light. It can be used as a protective cover on outdoor sheets or pipes made of such materials as polyethylene or polypropylene and on solar cells. The new film, which contains about 0.5 percent by weight of 3-allyl-4, 4'-dimethoxy-2-hydroxybenzophenone in copolymerization with the acrylic base, absorbs substantially more ultraviolet energy than typical commercial materials with similar properties. The new film is hard and dust-resistant. Its light absorption cuts off sharply as wavelength increases above 380 nm, so that it does not decrease the efficiency of solar devices. The molecular weight of the copolymer is approximately 60,000. The film may be applied to surfaces by solvent casting, coextrusion, or laminating. It may also be applied as a latex.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240. Refer to NPO-14971/TN.

0668 Coated Aluminized Film Resists Corrosion: An organic coating allows aluminum to be substituted for gold

National Aeronautics and Space Administration, Washington, DC.

Jan 83 (H)

A commercially available corrosion-protection coating allows less costly metals - aluminum in particular - to be used in heat-reflecting films for thermal barriers. Heretofore, such films have had to incorporate gold as the reflective layer if they were to withstand humidity, moisture, and salt spray without corroding. This is the first protective coating that prevents the corrosion of metalized films during environmental exposure and still remains flexible, thermally stable, and clear. The corrosion-protective coating is a plastic material, modified by the addition of antioxidation agents. It is applied to polyimide sheets on which a thin film of aluminum has been deposited. Detailed specifications have been prepared for the aluminized, coated film. The specifications include quality assurance tests for heat resistance, thermal emittance, coating adhesion, hardness, and other properties.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer, P.O. Box 8757, BWI Airport, MD 21240. Refer to MSC-20118.

0669 Coated Parts for Coal Gasification: Alloy coating protects against corrosion and erosion

Department of Energy, Washington, DC.

Mar 83 (C, H)

Certain parts of coal gasification units -- cyclones, heat exchangers, pipes, valves, and instrumentation -- are best constructed from heat- and corrosion-resistant alloys rather than from the ceramic and refractory materials used to contain the reaching solids and gases. A coating of chromium and aluminum alloyed with iron, nickel, or cobalt and a small amount of hafnium protects the heat-and corrosion-resistant alloys from oxidation and sulfidation. However, to be effective, the coatings must be dense, uniform, and free of cracks and pores. Two treatments ensure such characteristics: fusion either under a laser beam or in a vacuum furnace.

MATERIALS

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order numbers: DOE/ET/10245-1(Laser) and DOE/ET/10245-2(Furnace), price codes: A08 and A07, for information not in the report(s) contact Stanley J. Dapkunas, U.S. DOE, FE-3GTN, Room C-155, Washington, DC. 20545; (301) 353-2784.

0670 Coating Cloth With Amorphous Boron-Carbide:

High-quality amorphous boron-carbide coatings on cloth are deposited at lower temperature

Department of Energy, Washington, DC.

Nov 83 (G, H)

A new process uniformly coats cloth substrates with amorphous boron-carbide at a temperature below 1,000C. Because of this reduced temperature, the deposits do not crystallize, and the substrate remains undamaged—which is not the case with higher temperature processes. Carbon, graphite, and other ceramic materials also can be coated by this method. The substrate to be coated is contacted by a gaseous mixture of boron trichloride, at least one hydrocarbon, and hydrogen at a temperature between 700 and 1,000C and a total pressure ranging from 1 to 3000 torr. The resulting compositions have a variety of uses; for example, as wear surfaces having high melting temperatures. Multiple layers of the coated cloths can also be hot-pressed. The hot-pressed billets can be used as heat sinks in nuclear fusion-reactor wall armor.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,287,259, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

0671 Coating Reduces Steel Piston Wear: An aluminum/bronze coating, applied by gas/metal arc welding, provides lubricity and wear resistance

Army Materiel Development and Readiness Command, Alexandria, VA.

Jan 83 (F, H)

A cost-effective method for applying an aluminum/bronze bearing surface to steel pistons has been developed at the Rock Island Arsenal. This development allows the use of the more-durable cast steel instead of nodular iron for pistons. Steel has greater fracture toughness than the iron, but lacks the built-in lubricity to resist wear; the aluminum/bronze bearing coating provides the necessary wear resistance. Bearing and piston manufacturers may adopt this method of cladding their steel products to improve their service life.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report order number: AD-A097980, price code: A03 or contact project officer Mukesh Solanki (309)794-6198.

0672 Coatings for Protecting Aluminum Alloys: Shot peening followed by integral color anodizing are the best combination

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (H)

Several coatings and surface treatments have been evaluated for improving the fatigue strength of aluminum-alloy structural components in a study conducted by the U.S. Army Mobility Equipment Research and Development Com-

mand. Conventional anodic coatings used to increase the abrasion and corrosion resistances of aluminum alloys decreased their fatigue endurance, limiting the alloys to applications with low-load stresses. The test results have indicated that the shot peening combined with the ICA coating produced the alloy samples with the best fatigue endurance and enhanced surface strength up to 344 F.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A108869, price code: A02, or contact project officer Dario A. Emeric; (203) 664-4221.

0673 Comparison of High-Fragmentation Steels: Steels produced by single-conversion and a double-conversion process are evaluated

Army Materiel Development and Readiness Command, Alexandria, VA.

Aug 83 (H)

The first of the three-phase project to investigate and correct problems encountered in manufacturing high-fragmentation steels (HF-1) involves the evaluation and comparison of steels produced by two different processes. The study is being conducted for the U.S. Army Armament Research and Development Command. Included in the problems of producing HF-1 steel are excessive machining required mechanical properties, and steel anomalies. No significant differences were observed between steels furnace cooled and those alternately slow cooled, though improvements were obtained by tempering HF-1 steel immediately after quenching.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A105052, price code: A15 or contact project office William Sharpe (201) 328-2708.

0674 Composite Characterization Techniques: Methodologies for analyzing composite materials are surveyed

Army Materiel Development and Readiness Command, Alexandria, VA.

Oct 83 (D, H)

The results of a recent overview survey concerning the characterization of fiber-reinforced composites for reliability provide detailed descriptions of analytical methods and various management guidelines for implementing them. The survey was conducted for the U.S. Army Aviation Research and Development Command. A full range of special topics is covered from initial quality acceptance of prepreg constituents to durability analysis and service life, prediction of the composite structure. Thirteen tests are described for chemical quality assurance, processability, and cure monitoring, and an additional thirteen tests are described for NDE..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A118410, price

code: A04 or contact project officer R. J. Shuford (617) 923-3466.

Composite Fiber/Matrix Stability Measurement Using Ultrasound

See 0434

Composite Structural Fittings and Attachments: Designs permit disassembly of major structural components on helicopters

See 0005

Controlled Rolling of Steel Armorplates: Effects of modified hot-rolling process are investigated on mechanical and ballistic properties of steel armor

See 0532

Conventional Machining of ESR 4340 Steel: Grinding wheel and proper dressing procedures are the key to efficient low-stress grinding

See 0536

0675 Corrosion-Protection Coatings for Aluminum: Study investigates 21 combinations of surface treatments, primers, and top coats

National Aeronautics and Space Administration, Washington, DC.

Aug 83

Test results show that outstanding protection can be afforded to 2219-T87 aluminum alloy in severe seacoast and seawater environments. The tests were part of a study of the developments that have been made on protective coatings for aluminum since early in the Space Shuttle program. The study considered several types of coatings, including primers, enamels, chlorinated rubbers, alkyds, epoxies, vinyls, polyurethanes, water-based paints, and antifouling paints..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: NASA-TM-82402 price code: A02 or contact: Technology Transfer Division, P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25640.

Curing of Furfuryl Alcohol-Impregnated Parts: A longer cure and improved quality control prevent delaminations

See 0099

0676 Cutting-Fluid Study: Cutting fluids would be recycled in closed systems

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 (D, G)

The second phase of a program to establish a system for the selection and control of cutting fluids is discussed in a report of the U.S. Army's Rock Island Arsenal. The objective of the program is to improve the productivity and economy of machining at the arsenal. The recommendation that emerge from this study may be applicable with modifications to other large machine shops and factories that consume large amounts of cutting fluids. Machining operations were ranked according to a severity index that takes into account tool design, part design, workpiece hardness, and the physical characteristics of the specific operation. Ratings were given for turning, milling, boring, broaching, drilling, tapping, and grinding. Commercial cutting fluids were categorized according to their compositions and manufacturers' recommendations. The test results suggest that only

a few fluid types may suffice for most machining operations.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number AD-A119820, price code: A07 or contact project officer R.E. Johnson (309) 794-6712.

0677 Densification of Silicon Nitride: Strength and fracture toughness are improved

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (G, H)

Studies on the densification of various silicon oxide ceramics have demonstrated that both compositional and microstructural alterations can be used to control the resultant properties of the materials. The work, conducted by the U.S. Army Materials and Mechanics Research Center, is relevant to sintering and hot-gassing pressing processes which offer economic advantages and greater processing flexibility over conventional hot-pressing methods. Compositional control includes additive selection, such as MgO or Y₂O₃, for promoting densification, limitation of metal cation and carbon impurities, and control of phase compositions within the densified material.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A116652, price code: A02 or contact project officer George E. Gazza (617) 923-3000.

0678 Determining Shear Moduli of Orthotropic Composites: Tests show that composites differ substantially from conventional materials under torsional shear

National Aeronautics and Space Administration, Washington, DC.

Feb 83 (H, K)

New torsion tests on specimens of the same orthotropic composite material having at least two different thicknesses enable the determination of the effective in-plane and out-of-plane shear moduli. The torsion tests were developed to yield information on the degradation of properties of a composite saturated by moisture. The tests made clear that both uniaxial and cross-ply composites are not transversely isotropic, and the difference between in-plane and out-of-plane shear moduli should be taken into account in structural design.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div, P.O. Box 8757, BWI Airport, MD 21240. Refer to ARC-11395/TN.

0679 Diagnosis of Tank-Track-Pad Rubber: Tests will increase understanding of elastomer failure

Army Materiel Development and Readiness Command, Alexandria, VA.

Aug 83 (H)

Laboratory techniques to examine the physical and chemical changes in elastomers in service were evaluated in experiments by the U.S. Army Tank-Automotive Research and Development Command. The tests were conducted on synthetic-rubber tank-track pads in the uncured, cured-but-unused, and used conditions. Electron spectroscopy for chemical analysis (ESCA), differential-scanning calorimetry, scanning-electron microscopy (SEM) with an energy-dispersive analysis of X-rays (EDAX), thermogravimetric analysis,

solvent swelling, tensile testing, and thermally accelerated aging were all used to develop a molecular model of elastomer-failure mechanisms.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A087284, price code: AO4.

0680 Dual-Alloy Disks are Formed by Powder Metallurgy: High-performance disks have widely varying properties from hub to rim

National Aeronautics and Space Administration, Washington, DC.

Jan 83 (G, H)

Operating efficiencies and material conservation impose severe operating conditions on many systems. Advanced turbine disks for example may operate over a range of temperatures and stresses from the hub to the rim. Such a disk would require vastly-differing material properties. Disks made from one material and uniformly heat treated are not capable of meeting the property goals required. This difficulty can be overcome by the use of dual-alloy powder-metal processing. With this process, alloy components and processing can be tailored to meet the various requirements present in a single component part. A dual-property disk has been fabricated using two nickel-base alloys, AF-115 for the rim and Rene 95 for the hub.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report order number: NASA-CR-165224, price code: A09.

0681 Durability Test for Turbine Ceramics: Thirteen commercially-produced ceramic materials are evaluated

Army Materiel Development and Readiness Command, Alexandria, VA.

Dec 83 (H)

Methods have been developed for investigating the degradation in mechanical properties of silicon-based ceramics in high temperature oxidizing environments. The study, conducted by the U.S. Army Materials and Mechanics Research Center, evaluated six silicon nitrides (three hot-pressed and three reaction-bonded) and seven silicon carbides (one hot-pressed, four siliconized, and two sintered). Three testing procedures were performed on samples of each ceramic type in addition to the four-point bending test used to establish reference strength values.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A117463, price code: A05 or contact project officer George D. Quinn (617) 923-5980.

Eddy Current Technology Extends to Graphite Epoxies See 0443

Effects of Composite Materials on Avionics Equipment: Report suggests ways of coping with the absence of a built-in electromagnetic boundary

See 0009

0682 Effects of Phosphorus and Sulfur on the Toughness of Steel: Individual and combined effects are presented

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (H)

The results of an extensive study are available on the effects phosphorus and sulfur exert on the mechanical properties of steel. The work, conducted for the U.S. Army Materials and Mechanics Research Center, includes a computer analysis on data obtained from previous studies and experimental work. The computer analysis incorporated a multiple regression technique for determining statistically the combined effects of phosphorus and sulfur on steel toughness based on the individual effects. Results were obtained showing that higher phosphorus and sulfur contents raising the transition temperature and higher phosphorus contents raising the transition temperature and higher sulfur contents lowering the impact energy.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A116307, price code: A03.

0683 Effects of Steam on Alloy 800: Fatigue properties have been studied

Department of Energy, Washington, DC.

Sep 83 (H)

A test program was conducted to investigate the effect of the low-cycle fatigue and creep fatigue properties of alloy 800 stainless steel at high temperatures. The program showed that the presence of steam does not significantly shorten the fatigue life of alloy 800. Tubular specimens of the alloy with water inside were cycled to failure under strain control.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number DE82-019220, price code: A03

0684 Energy Efficient Winning of Aluminum from Ore: Proposed process promises to reduce energy consumption by one-third or more

Department of Energy, Washington, DC.

Aug 83 (D)

A recently proposed process of winning aluminum from ore requires considerably less energy than the Bayer-Hall process. The method, a combination of metallurgical and metallurgical/electrolytic techniques, is estimated to consume a total of 115 MBtu/ton of produced aluminum, as compared with 170 to 240 MBtu/ton for the Bayer-Hall process. In the new process crushed aluminous ore is blended with coke particles and pressed into pellets. The alumina is converted to aluminum sulfide (AL₂S₃), and the carbon is oxidized to form carbon monoxide. In a high-temperature electric-arc furnace, the AL₂S₃ is heated to 1,600 to 1,900 K where it decomposes into aluminum mono-sulfide which disproportionates and forms molten-aluminum metal.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,265,716, which is available from Commissioner of Patents, Washington, DC 20231 for \$1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. DOE, Washington, DC 20585.

0685 Ensuring the Consistency of Silicide Coatings: The optimum fusion time is determined from a simple diagram

National Aeronautics and Space Administration, Washington, DC.

Mar 83 (H)

A diagram specifies the optimum fusion time for given thicknesses of refractory metal-silicide coatings on columbium C-103 substrates. Adherence to the indicated fusion times ensures consistent coatings and avoids underdiffusion and overdiffusion. The diagram was developed as a result of X-ray tests on chamber-nozzle assemblies for the Space Shuttle reaction-control-system thrusters. For oxidation protection, the columbium parts of the assemblies are coated with silicide.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information and diagrams is available by ordering the monthly subscription package, order number PB83-925803, price code E02.

0686 Etchant for Hg(X)Cd(1-X)Te Crystals: A mixture of nitric and hydrochloric acids reveals crystal defects

National Aeronautics and Space Administration, Washington, DC.

May 83 (J)

A mixture of nitric and hydrochloric acids is a satisfactory etchant for HgCdTe crystals. Preferential etching by the acid solution reveals crystal-dislocation defects (type D) and impurity-dislocation defects (type S) in these crystals, which have optical and electrical applications.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25705/TN.

0687 Etchants for Chemically Polishing Quartz Crystals: New solutions etch faster and are easier to prepare

Army Materiel Development and Readiness Command, Alexandria, VA.

Oct 83 (G, H)

Hydrofluoric acid solutions of various concentrations are effective in chemically polishing SC-cut quartz crystals, according to experiments conducted at the U.S. Army Electronics Research and Development Command. These solutions require shorter etching time (some by less than half) and are easier to prepare than the currently-used NH₄/HF solutions.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A104903, price code: A02 or contact project officer Ronald J. Brandmayr (201) 544-4740.

0688 Extremely stable aqueous foam can be stored for long periods

Department of Energy, Washington, DC.

Apr 83 (H, J)

An extremely stable, high-expansion aqueous foam that can be stored for long periods as a liquid concentrate or solution has been developed at Sandia National Laboratories. The liquid concentrate, with expansion ratios from 20-1 to 600-to-1, was developed primarily to produce foam that obscures the vision of intruders into high-security areas such as nuclear material storage facilities. The foam has other safeguards and security applications and could also be adapted for use as substance for applying insecticides to crops. The new foam consists of 97.8 percent water, 0.8 percent surfactant (sodium lauryl sulfate or alpha olefin sulfonate), 0.2 percent polyacrylic acid-type polymer, 0.2 percent stabilizer (n-dodecyl alcohol), and one percent solvent (water-soluble alcohols such as nbutanol and n-propanol).

FOR ADDITIONAL INFORMATION: Contact: Public Information Division, Sandia National Laboratories, Box 5800, Albuquerque, NM 87185, (505) 844-4207.

0689 Fabricating Thin-Film High-Temperature Thermoset Resins: Cross-linking polymer is cast between two thin-film substrates

National Aeronautics and Space Administration, Washington, DC.

Feb 83 (G, H)

A two-substrate fabrication technique casts thin films of thermoset polymers to less than 1.0 mil. Other methods for casting thin polymer films include doctor blades, extrusion, high-pressure casting, injection molding, and ambient-pressure casting in rubber molds. However, these methods are more suitable for thermoplastic polymers. The new technique is for the fabrication of thin films of thermoset polymers. A major feature of this technique is that the thin-film substrates are removed from the polymer casting instead of the normal procedure of removing the casting from the substrate. A second major feature is the use of a frame for each thin-film substrate. The frame maintains a constant dimension of casting area and, therefore, prevents such surface imperfections as shrinkage.

FOR ADDITIONAL INFORMATION: Inquiries concerning rights for the commercial use of this invention should be addressed to the Patent Counsel, Langley Research center, Mail Code: 279, Hampton, VA 23665. Refer to LAR-12869.

0690 Fatigue Properties of Glass-Fiber-Reinforced PBT: Behavior is observed after exposure to water and air

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 (H)

The fatigue behavior of short glass-fiber reinforced polybutyleneterephthalate has been elucidated in tests performed for the U. S. Army Materials and Mechanics Research Center. Of particular interest in this study was the effect of temperature and humidity on failure mechanisms and stress/strain parameters. In general, the stress/strain tests showed that water degrades the polymer, with the greatest weakening occurring, as one would expect, in boiling water. The fatigue life depends in a complex way on environmental conditions, the test stress level, and the ductility of the starting material.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A087104, price code: A04 or contact project officer M. Roylance (619) 923-3514.

Ferrofluid Would Seal Linear-Motion Valve: A magnetic fluid would seal against pressure or vacuum

See 0556

0691 Fire and Explosion Hazards of Composite Materials: Structural damage and toxicity are considered

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (H)

A preliminary investigation of the fire and explosion hazards of fiber/epoxy materials has been conducted for the U.S. Army Aviation Research and Development Command. Although the focus was on problems likely to occur in battle-damaged helicopters, the findings bear upon the safety of

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other vehicles and structures designed to be occupied by humans. The investigation included a survey of the literature on the fire hazards, toxicity, and fire resistance of composite materials, and analytical techniques to simulate in-flight and postcrash fires.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A104757, price code: A06, or contact project officer William T. Alexander (804) 878-5251.

0692 Fire-Resistant Hydraulic Fluids and Lubricants: Phosphazene-based materials are evaluated

Army Materiel Development and Readiness Command, Alexandria, VA.

Dec 83 (H, J)

A report describes an evaluation of phosphazene fire-resistant fluids. Such fluids may be used in automotive vehicles, aircraft, and ships as hydraulic fluids and lubricants. The report covers methods of preparing fluids with low pour points, hydrolytic stability, and compatibility with other system components as well evaluation of such properties as viscosity, pour point, hydrolytic stability, emulsion characteristics, and elastomer compatibility. The evaluation was conducted in part by the U.S. Army Materials and Mechanics Research Center. In contrast to earlier work, which employed an azeotropic removal of water formed during the reaction of potassium hydroxide and phenol, sodium salts of trifluoroethanol and phenol were formed with sodium hydride in anhydrous dioxane or tetrahydrofuran. Three ways of adding the reactants were investigated. The samples have excellent fire resistance, as measured by high-pressure autogeneous ignition tests. They also had acceptable pour points and hydrolytic stability.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A117298, price code: A02.

0693 Fire-Retardant Epoxy Adhesives: Phosphorus in both resin and curing-agent molecules prevents fire propagation

National Aeronautics and Space Administration, Washington, DC.

May 83 (H, J)

A new phosphorus-containing epoxy is fire-retardant and translucent. Intended as an adhesive for laminated plastic sheets, the new material bonds well to titanium dioxide-filled plastic film, which ordinarily shows little surface interaction with adhesives. Both the epoxy resin and its diamine curing agent include covalently bonded phosphorus in their molecular structures.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: ARC-11430/TN.

0694 Flexible Seal Accommodates Part Mismatch: Seal accommodates movement up to 1/2 inch as pressure is applied

National Aeronautics and Space Administration, Washington, DC.

Jul 83 (F)

A new flexible seal deforms as needed during pressure testing of cylindrical chambers. Metal plates encapsulated in the seal enable it to withstand a pressure differential of 2,300 psi. Gaps up to 0.5 inch between a cylinder wall and

a test fixture are closed by the new seal. The primary seal consists of overlapping metal or composite segments molded into a rubber jacket. The segments provide the rigidity needed to withstand side loads, and the rubber provides the sealing surface and the flexibility required to conform to the variable eccentric shape. The new seal should have many industrial applications, particularly where heat or pressure causes distortion of the chamber being sealed. This can occur when cylinder wall thickness is nonuniform or when parts of the chamber are at different temperatures.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-19710.

0695 Fluids for Metal Cutting: Criteria for selecting and applying fluids are detailed

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 (F, G, H)

A report presents the results of a study of fluid lubricants for metal cutting. The report, which was prepared for the U.S. Army Industrial Base Engineering Activity, presents an analysis of existing manufacturing processes and requirements, evaluates available fluid products, and develops a preliminary fluid selection and application matrix. The study applies primarily to milling, turning, grinding, and boring procedures on 4100-series steel. A severity index was developed that ranked the difficulty of all these processes relative to cutting parameters, tool design, and workpiece hardness. Commercially-available cutting fluids were also ranked according to composition and manufacturer's recommendations.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number AD-A13966, price code: A09 or contact project office R.E. Johnson (309) 794-5424.

0696 Foam Protects From Intruders: Sticky foam prevents access to unauthorized or hazardous areas

Department of Energy, Washington, DC.

Apr 83 (D, H)

A recently formulated foam protects areas from unauthorized intrusion. The foam is stored as a liquid in a vessel that is connected to a pressurized gas tank. The vessel itself or a conduit system can be arranged to form an obstacle against intruders. If an intruder breaks through the vessel or the conduit, a very-sticky tenacious foam is released that engulfs the hands and the tool, making it very difficult if not impossible to proceed beyond the point. The foam consists of a viscous tacky resin. Suitable thermoplastic resins include a blend of styrene/butadiene copolymer and polyindene, a styrene-isoprene thermoplastic elastomer, a polyterpene, an elastomeric resin, or a polyisobutylene resin. The resin is preblended with a nucleating agent, which promotes the formation of a fine-celled foam.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: SAND-77-0269, price code: A02. For licensing information, contact: Office of Assistant General Counsel for Patents U.S. Department of Energy, Washington, DC 20585.

0697 Glass Fiber Improves Outdoor Cotton Fabrics

Department of Agriculture, Washington, DC.

May 83 (H)

Using glass to reinforce cotton yarn produces stronger, lighter weight outdoor fabrics. Fabrics produced from cotton/glass yarns have the appearance, touch, and finishing characteristics of all-cotton, but they are more resistant to deterioration from sunlight, mold, and mildew. Cotton/glass fabrics scored high in the accelerated weathering tests run at the Agricultural Research Service's Southern Regional Research Center. Also, when treated with a flame retardant, cotton/glass fabrics have better flammability resistance than 100-percent cotton.

FOR ADDITIONAL INFORMATION: Contact: Mr. Clarence O. Graham, 7 Regional Research Center, P.O. Box 19687, New Orleans, LA 70179; (504)589-7544.

Glass for Sealing Lithium Cells: New glass increases the life of lithium cells by a factor of 5

See 0337

0698 Glass for Solid-State Devices: Glass film has low intrinsic compressive stress for isolating active layers of magnetic-bubble and other solid-state devices

National Aeronautics and Space Administration, Washington, DC.

Mar 83 (B, H)

Two glass formulations are suitable as isolation layers in solid-state devices that incorporate magnetic films. The glasses have the low intrinsic compressive stress required of such layers. The entire substrate together with magnetic-bubble-domain layer may be any thickness. Deposited over the surface of the thin layer on the substrate is a planar barrier layer of dielectric - in this case the low-stress glass film. Over the barrier layer is a layer of a conductive material. This layer consists of discrete spaced-apart conductor elements or strips having a thickness of about 4,000..

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Division, P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: LAR-12781/TN.

Glass-Fiber/Epoxy Truck Hood and Fenders: Lightweight molded composite replaces heavier sheet-metal parts

See 0919

0699 Gradient-Furnace Processing of Structural Ceramics: A process grows single crystals of sapphire measuring up to 6.5 in. in diameter

Army Materiel Development and Readiness Command, Alexandria, VA.

Apr 83 (G, H, J)

A gradient-furnace process, developed by the U.S. Army Materials and Mechanics Research Center, grows large single crystals of sapphire that have a high degree of transparency. The new technique opens up many possibilities for new applications of ceramic, such as in transparent armor, 1-mm high-power laser windows, electronic substrates, acoustic surface-wave devices, gas bearings for inertial guidance, and others. The gradient-furnace technique essentially consists of the solidification of a melt onto a pre-existing seed crystal in a high-temperature crucible and cooled through controlled temperature gradients to obtain the nucleation and crystallization of the melt into a single crystalline form.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by order-

ing the NTIS report, AD-A092667, price code: A02 or contact project officer Joseph A. DeLai (617) 923-3603.

Graphite/Epoxy Composite Nose Cone: High-strength composite proves significant reductions in weight

See 0011

0700 Graphite/Epoxy Reinforcement for Gun-Barrel Extension: Modified extension gives greater accuracy

Army Materiel Development and Readiness Command, Alexandria, VA.

Mar 83 (H)

Gun-barrel extensions can be made lighter and stiffer by replacing the outer part of the metal with advanced composite material, according to a report of the U.S. Army Materials and Mechanics Research Center. The drooping of the extended barrel under its own weight contributes to the dispersion of emerging projectiles. To increase the stiffness/weight ratio and reduce these effects, the outer metal of the extension was machined away, to be replaced with a graphite/epoxy composite. The new extension was 14 percent lighter and showed greater stiffness, faster vibration damping, and lower round dispersion than the all-metal version. Similar benefits could be obtained by applying the composite-material technology to other artillery components as well as to a variety of aircraft, ground vehicles, and other structures requiring high strength/weight ratios.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A090386, price code: A02 or contact project officer Robert Lewis (617) 923-5351.

0701 Handbook on Glass-Reinforced Thermoplastics: Detailed design and property information are compiled

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (G, H)

An engineering handbook on discontinuous fiberglass-reinforced thermoplastics has been issued by the U.S. Army Materiel Development and Readiness Command. Containing a wealth of information, it can be used as an introductory textbook, as a guide to the selection of materials, and as a reference for the design of parts and fabrication processes. The volume concludes with a translation of trade names to generic terms listed by manufacturers, a section on standards, a glossary, and an index. This handbook provides valuable assistance to anyone who must design with these materials.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A106942, price code: E15.

Heat and Pressure Seal for Doors: Refractory fibers provide resilience

See 0075

0702 Heated Aluminum Tanks Resist Corrosion: Keeping a tank warm prevents moisture from condensing on it

National Aeronautics and Space Administration, Washington, DC.

Sep 83 (H)

The simple expedient of heating foam-insulated aluminum alloy tanks prevents them from being corroded by salt-laden moisture. A relatively-small temperature difference between such a tank and the surrounding air will ensure

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that the life of the tank is extended by many years. Aluminum is corrosion-resistant in air containing water vapor alone because of the protective oxide film that forms on its surface. However, the aluminum can corrode near seawater. The salt in the air breaks down the protective film and causes pitting. However, heating the interior of the tank to a temperature above that of the ambient air reverses the vapor-permeation trend and prevents moisture from condensing on the aluminum.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25780.

0703 High Creep Strength Structural Steel (Modified 9 Cr-1 Mo) for Elevated Temperature Service

Department of Energy, Washington, DC.

Jun 83 (H)

A modified 9 Cr-1 steel with creep properties matching that of Type 304 stainless steel through 600 C has been developed. The alloy is strengthened by the optimized additions of columbium and vanadium and is recommended for use in the normalized and tempered condition. The alloy also offers high fatigue strength and more resistance to stress-corrosion cracking than Type 304 stainless steel. The alloy has been commercially melted and fabricated and tubes have been installed in various coal-fired power plants. Specifications for the plate, tube, forgings, pipe and fittings are currently being reviewed by American Society for Testing and Materials subcommittees. Possible applications of this alloy include main steam pipe lines, switch valves, headers, transfer lines, reheater tubing, large vessels in fossil energy plants, steam generators for breeder reactor, and first wall of the fusion reactor.

FOR ADDITIONAL INFORMATION: Contact: D.W. Jared, Oak Ridge National Laboratory, P.O. Box X, Oak Ridge, TN 37830; (615) 574-4192. Request support package 448/X/TN.

0704 High Temperature Filler for Tile Gaps: Procedure using ceramic fabric can be used in kilns and furnaces

National Aeronautics and Space Administration, Washington, DC.

Nov 83 (H)

Gaps between ceramic tiles can be filled with ceramic-coated fabric that withstands temperatures as high as 2,400F. The caulking procedure with the material supplements existing gap fillers between supplements surface insulation tiles on the Space Shuttle; it saves time by permitting the repair of fillings already in place, without the need to remove, rework or replace them. High-temperature liners in kilns, furnaces, and other applications of heat-resistant insulation can also be caulked by this technique. These gap fillers maintain the required pressure against the sidewalls of the tiles, are flexible, and can withstand airloads and high-temperature exposure for repeated missions.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20137.

High-Modulus Composites for Helicopter Shafts: Candidates are screened for impact resistance, stiffness, and low weight

See 0014

0705 High-Performance Matrix Resins: Modified PMR polyimides have better processability and thermo-oxidative stability

National Aeronautics and Space Administration, Washington, DC.

Sep 83 (H, J)

State-of-the-art PMR polyimides (in situ polymerization of monomer reactants) provide good strength and light weight in a wide variety of critical applications. However, improved processability and elevated-temperature thermo-oxidative stability are desired in such polyimide systems. A series of improved polymer resins was developed. These high-performance matrix resins, intended for use in advanced composites, adhesives, and neat resin articles, show improvements in both processability and elevated-temperature stability over the state-of-the-art PMR-15 polymers. The improved modification of the PMR-15 system results from the addition of N-phenylmaleimide (PN) to the basic three-monomer reactant system.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: NASA-TM-82733, price \$7.00. Inquiries concerning rights for the commercial use of this invention should contact Norman T. Musial, Lewis Research Center, Mail Code 500-311, 21000 Brookpark Road, Cleveland, OH 44135; (216) 433-4000, Ext. 346. Refer to LEW-13864.

0706 High-Performance, Sintered Silicon Nitrides: Silicon nitrides with excellent thermomechanical properties were produced in a gas-pressure sintering process

Army Materiel Development and Readiness Command, Alexandria, VA.

May 83 (H)

Sintered silicon nitrides (Si_3N_4) containing 0.5 to 1.0 weight percent of beryllium and 2.5 to 3.7 weight percent of oxygen have been produced by a gas-pressure sintering (GPS) process, in a development sponsored in part by the U.S. Army Materials and Mechanics Research Center. Silicon nitrides are currently viewed as materials for gas turbines that would operate at inlet temperatures of 2,500F. The nitrides were sintered in a high-pressure, high-temperature furnace. The process involves the application of a two-step nitrogen-pressurizing technique to the sintering body. The sintered silicon nitrides have an average modulus of rupture representing 93 percent of their room-temperature strength. The GPS process is considered successful in producing small, high-density (98 percent) blades of sintered Si_3N_4 .

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A091757, price code: AO5 or contact project officer C.D. Greskovich (617) 923-5000.

0707 Hydrogen-Permeable Nickel Foil: An organic acid added to plating bath controls permeability

Department of Energy, Washington, DC.

Jul 83 (G, H)

A new process forms nickel foil having a controlled, predetermined permeability to hydrogen. The nickel foil has greater permeability and is considerably less expensive than palladium foil, which is ordinarily used to control hydrogen flow. The process consists of four basic steps: (1)

Passing a nickel-plating solution through a cation-exchange resin to remove copper and gold cations; (2) Immersing a nickel anode and a stainless-steel cathode in the purified plating solution; (3) Electrodespositing a thin layer of nickel on the cathode; and (4) Peeling the deposited nickel foil away from the cathode..

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,290,858, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1.00. For licensing information, contact: Office of Assistant General Counsel for Patents, US DOE, Washington, DC 20585.

Identification of Synthetic Fuels: Chromatographic techniques allow rapid identification of base stocks

See 0105

0708 Impact Performance of Fibrous Composites: Load-deflection characteristics are compared for aluminum and fiber composite structures

Army Materiel Development and Readiness Command, Alexandria, VA.

Aug 83 (D, H)

A program to determine the differences in impact behavior between aircraft structures fabricated with aluminum and fibrous composite materials was conducted by the U.S. Army Aviation Research and Development Command. The study involved the use of 1/2-scale models to investigate, in addition, the feasibility of using scaled structures for impact testing. The structure tested was representative of a helicopter pylon-support structure consisting of inner and outer skins connected by a series of beams running aft and by bulkhead.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A121618, price code: A02 or contact project officer Arthur J. Gustafson (804) 878-3222.

0709 Impedance Measurements of Zirconium Alloy Oxidation Films: Experiments shed light on high-temperature corrosion by steam

Department of Energy, Washington, DC.

Nov 83 (H)

High-frequency (greater than 500 Hz) ac impedance measurements have been used to monitor the permeability of oxidation films formed on zirconium alloys exposed to high temperature steam. The measurements were aimed at an improved understanding of the high-temperature steam-corrosion resistance of the alloys, since differences in oxidation-film permeability and ultimately to film characteristics.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-018769, price code: A03. For information provided in the report contact Peter M. Rosecrans, Knolls Atomic Power Laboratory, P.O. Box 1072, Schenectady, NY 12301;(518) 393-6111, ext 4477.

0710 Improved Abrasion-Resistant Coatings for Plastics: Hardness, clarity, and weatherability are increased by changes in proportions of ingredients

Army Materiel Development and Readiness Command, Alexandria, VA.

Mar 83 (H)

Improvements in abrasion-resistant coatings for plastics have resulted from an investigation performed for the U.S.

Army Aviation Research and Development Command. The coatings, originally developed for polymethyl methacrylate and polycarbonate helicopter windshields, could also be applied to automotive windshields, visors, goggles, and possibly eyeglasses. A number of different formulations were tested.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A091083, price code: A03.

Improved Ceramic for Heat Exchangers: Multicomponent formulation shows promise for automotive gas-turbine engines

See 0154

0711 An Improved Ceramic/Metal-Alloy Seal: New method produces seals that withstand high temperatures and pressures

Department of Energy, Washington, DC.

Aug 83 (H)

A new method of forming ceramic/metal-alloy seals produces electrodes durable enough to monitor the liquid level in pressurized water reactors (PWR's). Each electrode comprises a center pin surrounded by an outer housing, both made of an electrically conductive alloy (e.g., Inconel, or equivalent). A ceramic seal surrounding the center pin electrically insulates the pin from the housing. The seal must be durable enough to withstand the temperatures and pressures of the PWR environment, which are about 350 C and 10 MPa, respectively. Prefiring under low oxygen produces better bond adherence and more uniform bands; the controlled cooling prevents thermal stresses in the ceramic..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-013591, price code: A02.

Improved Coating for Torsion Bars: Longer bar life is bought at a small increase in cost

See 0920

Improved Electrodeposition of Chromium Coatings: Hardness, strength, and cathode efficiency are maximized

See 0574

0712 Improved Superconducting Palladium Copper Alloys: Simple preparation and conditioning procedures are described

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (H, J)

A method for raising the transition temperature required to achieve superconductivity in palladium alloys has been developed, making the preparation of these alloys easier. The work was conducted for the U.S. Army Armament Research and Development Command. Conventional methods for preparing palladium alloys are considerably more complex, require lower transition temperatures, or both. The highest transition temperature obtained was 12.4 K.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A110133, price code: A02 or contact project officer C.G. Homan (518) 266-5726.

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0713 Improving Ballistic Steels: Favorable combinations of high strength, toughness, and ductility are obtained
Army Materiel Development and Readiness Command,
Alexandria, VA.

Sep 83 (G, H)

A method for improving the blast protection properties of commercial-grade steels consists of an electrosag refining process followed by isothermal heat treatment. Development and evaluation of the technique were conducted by the U.S. Army Materials and Mechanics Research Center. The commercial grades of steel selected for processing were AISI 4330 with 2 percent silicon and AISI 4340 with 1.5 percent aluminum and 1.5 percent silicon. An electrosag remelting process was used to improve chemical homogeneity and structural uniformity of the samples.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A086453, price code: A04 or contact project office Naresh J. Kar (617) 923-5000.

0714 Improving Surface Strength of Insulating Tiles: A preglaze densification treatment helps tiles resist impact damage

National Aeronautics and Space Administration,
Washington, DC.

Oct 83 (H)

A procedure for improving tile resistance to impact damage is described in a new report on tile densification. Developed for the Space Shuttle reusable surface insulation, the procedure has potential application when space restrictions necessitate thin layers of insulation with low thermal conductivity. Examples are in advanced heat engines, such as the adiabatic diesel and the automotive gas turbine, as well as in fast-heating high-temperature ovens. The densification process increases the thermal conductivity of the surface layer but does not seriously affect the effective overall thermal conductivity.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20063.

0715 Inexpensive Antireflection Coating for Solar Cells: Titanium oxide is applied in a continuous spraying process

National Aeronautics and Space Administration,
Washington, DC.

Mar 83 (C, G, H)

A continuous method for applying an antireflection coating to solar cells increases the efficiency of these devices by preventing energy from being reflected away, but adds little to manufacturing cost. The method consists of spraying a solution on the cells or glass collector plates, drying the sprayed layer, and curing it. The solution is formulated to spread evenly over the surfaces. Previously, antireflection coatings have been applied by vacuum deposition or sputtering. The spraying solution consists of an organometallic titanium compound such as titanium isopropoxide, an inert ester diluent such as butyl acetate, 2-ethyl-1-hexanol and, optionally, a lower aliphatic alcohol. The coating has been applied successfully to glass plates and silicon solar cells..

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Division, P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15025/TN.

Inserts Automatically Lubricate Ball Bearings: Small inserts in the ball pockets provide a steady supply of lubricant

See 0578

0716 Laminated Composites Meet Cathodic Demands for Seawater Use

Department of Navy, Washington, DC.

Apr 83 (H)

Continuous graphite-fiber reinforced epoxy laminated composites are materials that scientists at the David Taylor Naval Ship Research and Development Center consider to have promise for a variety of applications in the marine environment. Noteworthy advantages that are inherent in these materials and not readily identifiable with marine grade alloys include corrosion resistance, high strength, high stiffness, low weight, and ease of fabrication into complex structures. A study was designed to quantify the cathodic efficiency of the laminated composite material. It is probable that nickel-aluminum bronze components of a cathodically protected structure in seawater could be replaced with graphite-epoxy without the necessity for redesign of the cathodic protection system.

FOR ADDITIONAL INFORMATION: Contact: Navy Technology Transfer, Naval Surface Weapons Center (E411), Dahlgren, VA 22448. Refer to the title.

0717 Laminating Polyimide Films: New processes yield void-free flexible laminates

National Aeronautics and Space Administration,
Washington, DC.

Jun 83 (G, H)

A new process for laminating large areas of high-temperature-polyimide film has applications in vehicle construction and in preparing flexible printed circuits. Linear polyimides are excellent candidates for such applications because of their high thermal stability at temperatures between 400 F and 500 F, their flexibility, and their light weight. The objectives of the process are to improve the bonding of high-temperature polyimide film, to prepare flexible, large-area, void-free laminates from polyimide film, and to laminate polyimide film not only to itself but to metal surfaces. Two variations for laminating polyimide film may also be used to prepare metal-containing laminates.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: LAR-12742/TN.

0718 Lightweight-Composite Truck Components: Substantial weight and cost reductions are demonstrated

Army Materiel Development and Readiness Command,
Alexandria, VA.

Nov 83 (D, H)

A program to design, fabricate, and test truck components made of composite materials has resulted in the development of light-weight leaf springs and propeller shafts. The work was performed for the U.S. Army Tank-Automotive Command. In addition to providing weight reductions of up to 50 percent, composite components are potentially more reliable than metal components because of the improved fatigue and corrosion resistance. Based on weight, cost, fa-

bricability, and component interchangeability, a hybrid design was chosen for the leaf springs consisting of alternating leaves of steel and fiberglass/epoxys a graphite/epoxy tube with adhesively bonded steel and sleeves.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A112770, price code: A11 project officer Avery H. Fisher (313) 574-6478.

0719 Liner for Silicon Reactor: A coating of sodium tetrafluoride minimizes contaminating high-purity silicon

National Aeronautics and Space Administration, Washington, DC.

May 83 (J)

The production of high-purity silicon by the reaction of silicon tetrafluoride and sodium results in reaction products, sodium fluoride and silicon, that adhere to the reactor walls. The reaction, which begins at 150C, can reach temperatures of 2,000C. At these high temperatures, there exists the danger of the nickel reactor walls melting. By using an NaF liner, the reaction products are removed by simply turning the reactor chamber upside down. There are other benefits to the NaF liner. The liner acts as a seeding agent for the NaF formed during the reaction.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15366/TN.

0720 Low Cost Insulator

Department of the Air Force, Washington, DC.

Jun 83 (H)

The development of a low cost insulation material for protection against rocket exhaust was investigated by the Air Force Rocket Propulsion Laboratory. The investigation verified the feasibility of developing an insulation material by using inexpensive ingredients. Analyses and testing revealed that by using an inexpensive filler mixed with a polymer, curing agent and cure catalyst, the mixture could be used to protect structures and facilities against rocket exhaust. Further investigation has revealed that a formulation using carbon black will produce the optimum results to achieve the goal of protection against rocket exhaust. The insulation material is very easy to mix and requires nothing special in the preparation.

FOR ADDITIONAL INFORMATION: Contact: TSgt Ernest B. Toscano, AFRPL/MKPA, Edwards AFB, CA 93523; (805) 277-5430.

Lubricating High-Temperature Engines: Reacting gases produce a solid lubricant

See 0156

Machnozzle Fabric Predryer: Device operates effectively and economically

See 0589

0721 Manufacturing Porous Stainless-Steel Nose Tips: Sintering conditions are chosen to obtain the required gas permeability

Army Materiel Development and Readiness Command, Alexandria, VA.

Jul 83 (G, H)

Techniques used to fabricate transpiration-cooled nose tips for missiles may prove useful in the general manufacture of porous metal parts. In a program conducted for the U.S. Army Materials and Mechanics Research Center, tips of the specified geometry and gas permeability were made from

sintered 316L stainless-steel powder. Fabrication begins with the pouring of the powder into an oversize mold. The mold is held upside down and vibrated to assure uniform compaction of the powder. The exact sintering conditions, such as powder coarseness, pressure, sintering time, and sintering temperature, are selected to impart the required porosity or gas permeability to the sintered billet.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A087837, price code: A06, or contact project officer G.F. Pittinato (617) 923-3523.

0722 Materials for Gas-Mask Fabrication: Thermoplastic polyurethanes show promise for molding lenses, facepieces, and unimasks

Army Materiel Development and Readiness Command, Alexandria, VA.

Jan 83 (G, H)

A study by the U.S. Army Armament Research and Development Command reports on alternate materials for fabricating XM-29 gas masks. The information may be of use to manufactures of industrial gas masks, safety equipment, diving equipment, or plastic optics. Particular attention was given to thermoplastic polyurethanes for molding lenses and other parts. Of these, the aromatic polyethers were the most promising, with enough strength to maintain lens shape after molding and with sufficient optical clarity.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A101301, price code: A06 or contact project officer John Scavnick (301) 671-2448.

0723 Measurement of Fracture Toughness by Short Rod Method: Ultrasml samples as small as 0.25 in. in diameter by 0.375 in. in length can be tested

Army Materiel Development and Readiness Command, Alexandria, VA.

Aug 83 (H, K)

A quality-assurance method has been developed to measure fracture toughness of various hardware steels using short rod samples. Design, development, and evaluation of the short rod method were conducted for the U.S. Army Materials and Mechanics Research Center. The method alleviates many of the problems of measuring fracture toughness with previous methods and requires less expense. A specially designed fractometer is employed that can accommodate different sample sizes.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A085892, price code: A03 or contract project office Lynn M. Baker (617) 923-3466.

0724 Measuring Dye Purity: Ultraviolet/visible spectroscopy produces accurate measurements and aids in manufacturing process control

Army Materiel Development and Readiness Command, Alexandria, VA.

Oct 83 (J)

A report discusses a study of the chemistry of B-1 dye (p-nitrophenylazo, 2-naphthylamine) in relation to process control in manufacturing the dye and the purity of the end product. According to the report, prepared by the U.S. Army Armament Research and Development Command, the ratio of

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absorbance at two electronic transitions can be used as a criterion of dye purity. Deviations from the ratios are shown to be related to impurities in the dye. Other analytic techniques are found to be less effective..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A104 520, price code: A03 or contact project officer Ellen Vigus (301) 278-2170.

Measuring the Electrical Properties of Epoxies: Resistances of precisely molded specimens are tested with a four-point probe

See 0467

0725 Measuring the Tensile Strength of B/Al Composites: A proposed nondestructive technique correlates damping measurements with material strength

National Aeronautics and Space Administration, Washington, DC.

Jul 83 (H, K)

The fabrication and maintenance of high-strength composite materials consisting of aluminum alloys reinforced by boron fibers are complicated by the fact that the strength of the fibers is significantly degraded by a boron/aluminum (B/Al) reaction at temperatures above 750F. Studies at Lewis Research Center have established that a principal source of the degradation is the diffusion of boron atoms into the aluminum matrix and the subsequent formation of a weak interfacial reaction phase on the fiber surface. Results indicate that by developing damping-strength correlations, one should be able to determine by periodic damping measurements not only the onset of thermally-induced strength degradation but also the quantitative magnitude of the structure's residual strength.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: NASA-TM-79080, price code: A03.

0726 Mechanical Behavior of Coated SiC/C Filament: Study identifies the parameters that affect the mechanical properties of the filament

Army Materiel Development and Readiness Command, Alexandria, VA.

Aug 83 (H)

The effects of coating SiC/C filaments with chemically-vapor-deposited (CVD) tungsten or tantalum carbide were investigated. A report on the CVD process and the mechanical properties of the coated filaments was prepared for the U.S. Army Armament Research and Development Command. Filament coatings prevent filament/composite interaction during the fabrication of high-strength, filament-reinforced metal matrix composites used in high-temperature applications, such as in turbojet engines.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A83395, price code: A03 or contact project officer W. Heffernan (518) 266-5945.

0727 Mechanical-Working Effects in SiC-Reinforced Aluminum: Whisker damage and other defects degrade mechanical properties

Army Materiel Development and Readiness Command, Alexandria, VA.

Jul 83 (H)

The effects of mechanical working on SiC whisker-reinforced aluminum were investigated in experiments at the U.S. Army Materials and Mechanics Research Center. The dispersion, length/diameter ratio (L/D) and orientation of whiskers were determined by optical and electron microscopy. The results of these examinations were correlated with the mechanical properties of the composite material. It appears that both high-strength and high-modulus SiC/Al composites are feasible.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-AO87565, price code: A02 or contact project officer Peter Gillis (617) 923-3466.

0728 A Milder Solution for Stress-Corrosion Tests: Excessive pitting is eliminated

National Aeronautics and Space Administration, Washington, DC.

Sep 83 (H)

A solution of 2.86 percent NaCl and 0.52 percent MgCl₂ in H₂O is suitable for stress-corrosion testing of aluminum alloys. It gives test results similar to those obtained with synthetic seawater, but is less expensive to prepare. Because the NaCl/MgCl₂ solution is less expensive than the artificial seawater, it will probably be preferred for future SCC testing.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: NASA-TM-82452, price \$7.00.

0729 Minimizing Corrosion of Kovar Leads: Study outlines the steps that would make these leads less susceptible

Department of Energy, Washington, DC.

Nov 83 (B, H)

Kovar leads in semiconductor lead frames are susceptible to corrosion, and steps can be taken to minimize this corrosion, according to a study of commercially produced lead frames. The leads are known to develop pinholes, blisters, and craters when they are exposed to moisture and to certain electrolytes. An analysis of five commercial fabrication processes and accelerated testing have shown what steps the manufacturers should follow to reduce this problem.

FOR ADDITIONAL INFORMATION: Detailed information about technology described may be obtained by ordering the NTIS report, order number: DE82015659, price code: A03.

0730 New Coatings Add Water Repellency to Glass Elements

Department of Navy, Washington, DC.

Jan 83 (H)

New water-repellent coatings for optical elements such as lenses and windshields have been announced by the Naval Weapons Center. These coatings are effective not only on uncoated glass but also on surfaces that have previously been coated with inorganic substances to enhance performance of the lens. Magnesium fluoride (MgF₂), for example, has been employed as a coating to impart antireflective qualities to a lens and thus increase its transmissivity, or light-gathering capabilities. Compositions are found to actually chemically bind with water molecules which are hydrogen bonded to the optical surface.

FOR ADDITIONAL INFORMATION: Contact: Navy Technology Transfer Fact Sheet, Code E411, Naval Surface Weapons Center, Dahlgren, Virginia 22448. Refer to 070703.

Noise-Dampening Structural Alloys: High-strength cobalt/iron alloys have vibration absorption properties for noise abatement

See 0417

Noncrystalline Thin-Film Materials: A broad range of thin-film materials is characterized

See 0116

Nondestructive Testing of Magnesium/Alumina Composite: Internal flaws are located by a variety of techniques

See 0474

0731 Novel Polymeric Materials Developed to Package and Protect Delicate Parts

Department of the Navy, Washington, DC.

Aug 83 (H)

A novel class of polymeric materials were developed which protect precision bearings, electronic components, and delicate instruments from damage caused by static charge during packaging, storing, and shipping. The ion-implanted electroactive polymers provide a new approach in the making of conductive packaging materials. The packaging is used to protect components which could be damaged by static charge. The formation of a static charge often leads to the contamination of precision mechanical parts by particulates and can result in damage to electronic components due to electrical discharge. These ion-implanted, electroactive polymers have good conductivity, are flexible, and can be heat-sealed in some cases. These polymers are stable to oxidation by air and do not contaminate parts stored in the polymer bag.

FOR ADDITIONAL INFORMATION: Contact: Mr. Lloyd Carter, Naval Research Laboratory, Code 2610, Washington, DC 20375; (202)767-2541.

Oxidation-Strengthened High-Temperature Rivets: Shear strength of titanium-niobium rivets improves with oxidation

See 0601

0732 Performance of Synthetic Crankcase Oils: Significant savings are obtained in diesel engines

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (D, H)

A two-phase test program was conducted for the U.S. Army Mobility Equipment Research and Development Command to evaluate synthetic crankcase oils in gasoline and diesel engines. The objective was to determine whether synthetic oils can extend the oil-change and oil-filter-change intervals without affecting engine reliability and life cycle.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A109023, price code: A09 or contact project officer Thaoma Bowen (703)664-3435.

0733 Plasticity of a Fine-Grained Aluminum Alloy: Materials withstands considerable elongation before breaking

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 (H)

Fine-grained 7475 aluminum alloy can be plastically deformed to complex shapes, according to an experimental study conducted to the U.S. Army Armament Research and Development Command. The study included tests to determine the strain-rate sensitivity of flow stress, strain hardening, and total elongation in the temperature range of 427 to 516 C. In addition, small test parts were fabricated by gas-pressure plastic forming.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A084692, price code: A04 or contact project officer C. H. Hamilton (201) 328-2295.

0734 Plating to Reinforce Welded Joints: Electrodeposition of nickel is used to reinforce or strengthen weld joints

National Aeronautics and Space Administration, Washington, DC.

Jan 83 (G)

Electrodeposition is used to strengthen welded joints that have been gouged, nicked, or suffered other mechanical damage. The joint is prepared by grinding or sanding until it is smooth and flush with the adjacent material. An acrylic plating cell is assembled to fit around the area to be plated and is sealed to prevent leakage. This method has been used to reinforce defective weld joints of coolant supply lines of flight nozzle assemblies. It can be used in other situations in which in-place reinforcement of weld joints would result in cost reduction or in a saving of time.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer, P.O. Box 8757, BWI Airport, MD 21240. Inquires concerning rights for the commercial use of this invention should be addressed to the Patent Counsel, Marshall Space Flight center, Mail Code: CC01, Marshall Space Flight Center, AL 35812. In both cases refer to MFS-19576.

0735 PPQ's Containing Pendent Ethynyl and Phenylethynyl Groups: Polyphenylquinoxalines containing cross-linking groups have higher use temperature and solvent resistance

National Aeronautics and Space Administration, Washington, DC.

Mar 83 (H)

PPQ's were prepared containing various amounts of latent cross-linking groups: pendent ethynyl groups and pendent phenylethynyl groups. As these polymers are exposed to elevated temperatures, a thermally induced reaction of the pendent groups occurs to provide cross-linking, which raises the use temperature of the polymer and also improves its solvent resistance. The polymers prepared in this synthesis have potential applications as high-temperature adhesives, laminating resins, protective coatings, membranes, and films..

FOR ADDITIONAL INFORMATION: Contact: The Patent Counsel, Langley Research Center, Mail Code 270, Hampton, VA 23665. Refer to LAR-12838.

0736 Predicting Plane-Strain Fracture Toughness for Steels: A correlation is found with Charpy V-notch test data

Army Materiel Development and Readiness Command, Alexandria, VA.

Jan 83 (H)

Fracture-toughness tests were conducted, by the U.S. Army Armament Research and Development Command, to deter-

mine a correlation between the plane-strain fracture toughness and other measureable mechanical properties for a number of different gun steels. This was part of an effort to develop quantitative techniques for the design of gun tubes resistant to brittle fracture. The results should be generally applicable to the design of metal parts subject to stress.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report order number: AD-A099736, price code: A04 or contact project officer Steve Tauscher (518)266-4170.

Prepolymer Syrup for Encapsulating Solar Cells: N-butyl acrylate polymer/monomer syrup can be used for dipping and coating

See 0366

0737 Pressure Assist Makes Coating More Reliable:

Pressurization forces silicone resin into the pores of an anodized surface

National Aeronautics and Space Administration, Washington, DC.

Nov 83 (B, G, H)

Designers of the Space Shuttle S-band communications system have found a new use for an old idea--applying pressure to improve the bond between a viscous coating and porous surface. In the Shuttle hardware, its new use is to increase the reliability of resincoated anodized switch contacts.

FOR ADDITIONAL INFORMATION: A copy of the original Tech Note fact sheet containing more detailed information is available by ordering the monthly subscription package, order number PB83-925811, price code E02.

0738 Preventing Cracks in Titanium Rotary Seals: A plastic insert maintains a seal while it prevents rubbing of metal parts

National Aeronautics and Space Administration, Washington, DC.

Jul 83 (F, H)

An improved rotating cryogenic joint employs a seal composed of polytrichlorofluorethylene (PTCFE) between titanium moving parts and other metal parts. In a cryogenic pump, a PTCFE labyrinth seal separates the housing from the titanium impeller. In the improved joint, the titanium impeller rubs against plastic, not metal. As a result, localized heating of the titanium--and its subsequent cracking--is eliminated.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-19686.

0739 Process for Making Silicon Carbide Shapes: Uniform samples with submicron pore size have been produced

Army Materiel Development and Readiness Command, Alexandria, VA.

Jan 83 (G, H)

The development of a process for manufacturing silicon carbide-based structural ceramics is proceeding under the auspices of the U.S. Army Materials and Mechanics Research Center. The new process is intended to reduce microstructural flaws and other defects that degrade material properties and intensify processing requirements. The objective is to produce low-cost shaped components with adequate low- and high-temperature strength and stiffness, low coefficient of expansion, and low density.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report order number: AD-A098158, price code: A03.

0740 Process Sprays Uniform Plasma Coatings: Multicomponent plasma coatings are applied without the segregation of components

National Aeronautics and Space Administration, Washington, DC.

Dec 83 (G, H)

A composite-powder processing procedure has been developed along with plasma-spray parameters to achieve homogeneous, well-bonded, low-porosity, self-lubricating coatings. The purpose was to improve the compositional uniformity of the sprayed coating and to obtain a process that could be used by vendor organizations in preparing and applying these powders and coatings. The coating was NASA-developed lubricant PS 106, which has the nominal composition by weight of 35 silver, 35 Nichrome, and 30 calcium fluoride.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: NASA-CR-3163, price code: A05.

0741 Process Yields Strong, Void-Free Laminates: An accurate, reproducible fabrication process produces composites of consistent quality

National Aeronautics and Space Administration, Washington, DC.

Nov 83 (G, H)

The need for lightweight materials as structural components for future space transportation systems has stimulated the development of a systematic method for manufacturing a polyimide/graphite composite. Laminates manufactured by this process are void-free, exhibit excellent thermo-oxidative stability up to 315 C, and are 40 percent lighter than aluminum. The composite material consists of an LARC-160 polyimide resin matrix reinforced with graphite fibers. The resin system is formulated to a molecular weight of 1,600 with ethyl alcohol as the solvent.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: LAR-12982/TN.

Production of Impact-Resistant Plastic Windows: At half the weight, polyolefin panels the same protection as polycarbonate panels

See 0083

0742 Protective Coatings for Optical Fibers: A combination of fluoropolymer films strengthens fibers and seals them against moisture

Army Materiel Development and Readiness Command, Alexandria, VA.

Dec 83 (H, J)

A report presents results of a study of fluoropolymer coatings on optical fibers as a means of preventing stress corrosion. Two polymers were investigated: a heat-cured fluoropolymer and a photocured fluoroacrylate. In addition to barrier properties, the study considered such factors as flexibility, strength, and modulus. In both materials, fluorine is incorporated into the polymer chain as fluoromethyl groups. The fluorepoxy has an additional fluorinated hexane attached to the aromatic ring. The long chain adds flexibility, whereas

the aromatic ring gives strength and resilience. The study was conducted in part by the U.S. Army Communications-Electronics Command.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A117346, price code: A02.

Protective Coatings for Torsion Bars: Plastic corrosion-resistant coating is cost effective and improves service life

See 0923

0743 Purifying Metals by Filtration: Filtering out impurities from molten alloys improves the surface and physical properties of the finished product

Army Materiel Development and Readiness Command, Alexandria, VA.

Aug 83 (G, H)

A report discusses a study of the feasibility of purifying molten aluminum-, steel-, and nickel-based superalloys by filtration. In the study, which was made for the U.S. Army Materials and Mechanics Research Center, an apparatus for depth filtration molten aluminum with flow rates of 1 to 17 Kg/sq m-sec has been designed and built. In addition a steel filtration apparatus have been designed and is being assembled.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A086257, price code: A02 or contact project officer Arthur Ayvazian (617) 923-3233.

0744 Recharging 'Hot-Melt' Adhesive Film: Hot-melt adhesive charge is held in place by a one-sided tape

National Aeronautics and Space Administration, Washington, DC.

May 83 (D, H)

A technique for recharging a surface with a 'hot-melt' adhesive film makes use of a one-sided, high-temperature, pressure-sensitive adhesive tape. The technique was originally developed for use in space, where the absence of gravity can cause the adhesive charge to 'float' away, due to the lack of tack. The primary purpose of the one-sided tape is to hold the hot-melt charge in place until it is fused to the surface and has been cooled, the tape is removed, leaving the adhesive on the surface. This technique could be used where certain constraints, such as fixed inverted position of the surface to be recharged, would limit the use of other methods for applying a hot-melt adhesive film. Inquiries concerning nonexclusive or exclusive license for its commercial development are desired..

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: LAR-12881/TN.

0745 Reducing Costs of Carpet Finishing: Conserving materials as well as energy greatly reduces process costs

Department of Energy, Washington, DC.

Aug 83 (G)

Energy consumption in commercial carpet-finishing plants can be reduced greatly by a combination of conservation technologies. The technology of 'bump and run,' in which dye-bath temperature is allowed to drift for the last 85 percent of the time a carpet is held in the bath, instead of

being maintained by steam heating, reduces energy consumption by 38 percent with a small capital investment.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DOE/CS/40081/TI, price code: A07.

Repairing Composite Fuselages: Patch kits and modular construction will speed helicopter repairs

See 0021

0746 Repairing Voids and Delaminations in Composite Materials: Proposed tool forces adhesive into cracks

National Aeronautics and Space Administration, Washington, DC.

Aug 83 (F, H)

A proposed method for repairing voids and delaminations in graphite/epoxy composite materials is based on the injection of an an adhesive under pressure. A hole is drilled in the material to the depth of the void or delamination, and adhesive is forced through the hole into the material. The adhesive fills a void (a gap resulting from the absence of bonding material) or is forced into a delamination (a crack between unbonded layers of laminate), expanding to delamination slightly to ensure full penetration.

FOR ADDITIONAL INFORMATION: For information on this invention and/or possible licensing Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to MSC-20131.

Research Progresses to Improve Corrosion Resistance of Steel Ball and Roller Bearings

See 0622

0747 Resistance of Some Steels to Stress-Corrosion Cracking: Five high-strength low-alloy steels are highly resistant

National Aeronautics and Space Administration, Washington, DC.

Jan 83 (H)

Evaluations of the stress-corrosion cracking resistance of five-strength low-alloy steels are described in a report. Specimens of 4130, 4340, H-11, D6AC, and HY140 were stressed up to 100 percent of their yield strengths and were exposed to alternate immersion in saltwater, salt spray, and seacoast environments. The alloys were found to be susceptible to stress-corrosion cracking at stresses above these tensile strengths, and the susceptibility increased with increasing tensile strength.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report order number: NASA-TM-78276, price code: A03.

0748 RF Curing of Epoxy/Fiberglass Composites: Tools and process parameters were developed for this economical process

Army Materiel Development and Readiness Command, Alexandria, VA.

Jul 83 (F, G, H)

A study of the conveyORIZED RF curing of epoxy/fiberglass composites resulted in an inexpensive tool for the process and in the identification of process parameters, according to a report for the U.S. Army Materials and Mechanics Research Center. The significance of RF curing is economy. It uses less energy than such conventional curing processes

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incorporating ovens, autoclaves, resistant or radiant heaters, and the like.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A089728, price code: A12.

0749 Sample Design for Composite Tensile Testing: Streamline geometry provides more accurate measurements

Army Materiel Development and Readiness Command, Alexandria, VA.

Oct 83 (H, K)

Four types of sample geometries were evaluated to improve tensile-strength measurements of glass-reinforced composites. Selection and testing of the designs were conducted by the U.S. Army Materials and Mechanics Research Center. Previous samples types have had such deficiencies as failing in nonuniform-width regions, giving strength measurements that do not accurately characterize the material under test.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A120257, price code: A02 or contact project officer Kanu R. Gandhi (617) 923-3165.

0750 Saving Energy Costs in Plywood and Veneer Industries: A handbook advises on simple, fast-payback methods

Department of Energy, Washington, DC.

Sep 83 (C, D, G)

A handbook presents ideas for energy conservation in the plywood and veneer industry. The handbook covers: Reducing the cost of process energy --which accounts for 80 to 90 percent of energy cost --in steam systems, compressed-air systems, veneer dryers, and heat recovery; Reducing lighting costs by adjusting lighting, controlling the use of lights, and installing more efficient lights and fixtures; and Reducing heating costs by controlling building temperature, lowering temperature settings when a building is unoccupied, and improving heating-system efficiency.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-006012, price code: A04 or for information not in the report, contact XENERGY, INC, 60 Mall Rd., Burlington, MA 01803; (617) 273-5700.

Sealants for Thermal Solar-Collector Cells: Evaluation characterizes the performance of these sealants under various conditions

See 0374

Sealants Suitable for Flat-Plate Solar Collectors: Study evaluates 20 materials for suitability under various operating conditions

See 0375

0751 Silicon Nitride Coatings on Silica Substrates:

These coatings increase the surface hardness of slip-cast fused silica substrates

Army Materiel Development and Readiness Command, Alexandria, VA.

Jul 83 (H)

Pyrolytic silicon nitride coatings were deposited on slip-cast fused silica (SCFS) substrates in a study conducted by the U.S. Army Materials and Mechanics Research Center.

These coatings were evaluated for their mechanical hardness, spectral-infrared reflectivity, and response to a continuous-wave laser radiation at 10.6 micro m. The measurements have shown that even, thin coatings of silicon nitride increase the surface hardness of SCFS substrates from its usual value of 560 kg/sq mm. An increase in the deposition time to increase the thickness of layers degrades the SCFS substrates.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A089130, price code: A02 or contact project officer Dennis J. Viechnicki (617) 923-3463.

Sodium Gluconate in Corrosion-Removing Compounds: Direct method is more accurate and requires minimum sample preparation

See 0125

0752 A Solvent-Resistant, Thermoplastic Poly(imidesulfone): Polymer incorporates the desirable properties of polyimides and polysulfones

National Aeronautics and Space Administration, Washington, DC.

Sep 83 (H, J)

A process for preparing a thermoplastic poly(imidesulfone) results in a material that has the excellent thermoplastic properties generally associated with polysulfones and the excellent solvent resistance generally associated with polyimides. The new thermoplastic, solvent-resistant polymer can be used as a molding resin, as an adhesive, and as a matrix resin for fiber-reinforced composites. The process for thermoplastically forming this resin can be used to produce moldings, adhesive bonds, and fiber-reinforced composites. This poly(imidesulfone) can be thermoplastically processed in the 250 -to- 350C range to yield high-quality tough moldings, strong high-temperature-resistant adhesive bonds, and well-formed structural composites. It should be an excellent candidate for further development as a high-temperature adhesive and molding compound for aerospace applications.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MC 21240; (301) 621-0100. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to Howard J. Osborn, Landley Research Center, Mail Code: 279, Hampton, VA 23665; (804) 827-3725. In either case refer to LAR-12858.

0753 Solventless Fabrication of Reinforced Composites: Heat and pressure convert a fiber bundle into a fiber-reinforced composite

National Aeronautics and Space Administration, Washington, DC.

May 83 (G, H)

A new processing technique creates fiber-reinforced composites from solvent-resistant thermoplastics. In the new method, solid fibers of the thermoplastic and fibers of reinforcing agent are intimately mixed, heated, and compressed. The combination of pressure and temperature melts the thermoplastic, causing it to flow and fill the spaces between the reinforcing fibers. After cooling, the composite has properties similar to those of composites fabricated by conventional solvent processing. It can be machined, wound into filaments, and woven into fabric.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: LAR-12856/TN.

0754 Some Processing Effects on Reinforced Polysulfones: High thermoforming temperature degrades strength

Army Materiel Development and Readiness Command, Alexandria, VA.
Sep 83 (H)

High temperatures degrade the mechanical properties of certain reinforced polysulfones, but exposure to common maintenance solvents does not. These and other conclusions were drawn from an investigation of the effects of typical fabrication and maintenance conditions conducted for the U.S. Army materials and Mechanics Research Center.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A106004, price code: A06 or contact project officer Nathan R. Katz (617) 923-3415.

0755 Stable Polyurethane Coatings for Electric Circuits: Alkane-based polyurethanes resist deterioration while maintaining good dielectric properties

National Aeronautics and Space Administration, Washington, DC.
May 83 (H)

Polyurethane coatings and encapsulation compounds based on alkanes instead of ethers have superior chemical, electrical, and mechanical properties. High temperature and humidity have little effect on the alkane-based polyurethanes. Water-vapor transmission rates through polyurethane film prepared from alkanes are low in comparison with those for ether-based material. The alkane-based polybutadiene polyols. Major use of polyurethanes are as connector potting materials and as conformal coatings for printed-circuit boards. An important requirement for such applications is good dielectric properties. The dielectric properties of alkane-based polyurethanes are well within the specification and remain so.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25663/TN.

0756 Stepped Temperature Stress-Rupture Test: Time and temperature dependence of mechanical properties are obtained

Army Materiel Development and Readiness Command, Alexandria, VA.
Sep 83 (H, K)

A procedure for screening critically-stressed ceramic components, such as silicon-based ceramics used in the construction of vehicular gas turbines, provides data on their susceptibility to static fatigue failure. Development of the stepped temperature stress-rupture(STSR) test was performed by the U.S. Army Materials and Mechanics Research Center. The test represents a simplification of conventional stress-rupture test, which require numerous samples and test rigs to investigate the entire temperature range of a new material. The procedure involves placing a flexural sample on a four-point bend fixture in a furnace and heating it to 1,000C.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by order-

ing the NTIS report, order number:AD-A086041, price code: A02 or contact project officer R. Nathan Katz (617)923-3415.

0757 Sterilizable Binder Is Stable at 135 C: Material with few unsaturated double bonds has the needed stability

National Aeronautics and Space Administration, Washington, DC.
May 83 (H, J)

A polyurethane binder for solid propellants that can endure heat sterilization without decomposition is based on an ester diol. The binder, which resists oxidation under prolonged exposure to 135 C temperature, is low enough in viscosity that it can be handled easily during processing and readily mixed with oxidizers, such as ammonium perchlorate. The polyurethane is also a suitable material for encapsulants, potting compounds, and coatings that must be sterilized.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. refer to: NPO-15020/TN.

0758 Strength Degradation of a Polymeric Composite: Effects of moisture absorption on mechanical properties are investigated

Army Materiel Development and Readiness Command, Alexandria, VA.
Aug 83 (H)

Measurements were made on the moisture absorption and strength degradation of an aramid fiber/epoxy composite at various environmental conditions. A report on the results, with a failure analysis, was prepared for the U.S. Army Materials and Mechanics Research Center. Both the fiber and polymeric matrix absorb moisture affecting the strength of the composite, which is used in structural applications. The composite consisted of Kevlar 49 filament wound with epoxy. Plate and tube forms were fabricated, then subjected to four different environmental conditions.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A085670, price code: A03 or contact project officer Edward M. Wu (617) 923-5000.

0759 Strength of Alpha Silicon Carbide at High Temperatures: Slow crack growth is found to increase with temperature

Army Materiel Development and Readiness Command, Alexandria, VA.
Nov 83 (H)

A report describes uniaxial tensile- and flexural-stress rupture testing of sintered alpha silicon carbide in air at temperatures of 1,200 to 1,400 C. The tests were performed at various levels of applied stress, and the corresponding times to failure were measured. Sintered alpha silicon carbide is being investigated for use in structural components for gas turbines and diesel engines. It offers good oxidation resistance and strength at high temperatures, high thermal conductivity, and possibly better creep resistance than other ceramics.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A121437, price

MATERIALS

code: A05, or contact project officer E. M. Lenoe; (617) 923-3426.

Strength of Rewelded Inconel 718: Repeated repair welds do not affect joint strength

See 0637

Stress Analysis of Tetracore: Study evaluates the structural behavior of this tetrahedral structure

See 0026

0760 Study of Materials to Resist Corrosion in Condensing Gas-Fired Furnaces

Gas Research Inst., Chicago, IL.

Apr 83 (C, D, H)

Research was conducted to evaluate the corrosion resistance of various materials of construction for condensing gas-fired-furnace heat exchangers and to assess potential problems in condensate disposal. Since the condensate is mildly acidic, corrosion-resistant heat-exchanger materials are required to ensure adequate equipment life. Austenitic and titanium-stabilized type 430 stainless steels showed excellent resistance to corrosion under the test conditions. Most plastics were resistant to condensate but have temperature limitations specific to each polymer. Porcelain and epoxy coatings performed well.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB82-240003, price code: A07, or contact R. J. Hemphill, Gas Research Institute, 8600 West Bryn Mawr Ave., Chicago, Illinois 60631; (312) 399-8100.

Tests of Conformally-Coated Circuit Boards: Coatings prevent the formation of leakage paths

See 0298

0761 Texture Strengthening of Armor Plates: The A-286 austenitic steel appears to be most promising from the standpoint of texture strengthening

Army Materiel Development and Readiness Command, Alexandria, VA.

Jul 83 (H)

The U.S. Army Materials and Mechanics Research Center sponsored an experimental and theoretical study of face-centered cubic (f.c.c.) materials, such as 7039 aluminum, 5-percent Ni alloy steel, and A-286 precipitation-hardened austenitic steel, for possible texture-strengthening effects. Texture configurations (110) and (111) were identified as the strongest contributors to the through-thickness strength; i.e., ballistic resistance. A computer program was developed for calculating Taylor factors from pole-figure data by incorporating the spatial crystallite-orientation distribution function.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A090464, price code: A05, or contact project officer Antone Zarkades (617) 923-3111.

0762 Thermal-Gradient Fining of Glass: Temperature gradients may drive off bubbles in a gravity-free environment

National Aeronautics and Space Administration, Washington, DC.

Sep 83 (G, H)

Molten glass could be fined (cleared of bubbles) by heating with a suitable temperature gradient, according to preliminary

experiments. Although thermal-gradient fining has been studied by NASA as one of several material-processing methods for use in low-gravity manufacturing, the technique could also be of value in terrestrial glass processing. A temperature gradient produces a force on gas bubbles trapped in molten glass pushing the bubbles to a higher temperature region where they can be collected. The concept has been demonstrated in experiments on Earth and on a rocket.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MFS-25757.

0763 Thermal-Shock-Resistant Ceramic Coatings on Metal: Experimental coatings are evaluated for use as gas-turbine seals

Army Materiel Development and Readiness Command, Alexandria, VA.

Jul 83 (H)

Layers of ceramic and ceramic/metal composite deposited on stainless steel were tested for resistance to thermal shock, with a view toward application as abradable gas-turbine seals. In tests performed by the U.S. Army Aviation Research and Development Command, samples with yttria-stabilized zirconia outer layers were cycled with severe thermal gradients and examined for cracking, spalling, and microstructural changes caused by thermal stress and prolonged exposure to high temperature. A porous-metal approach proved more effective than the ceramic/metal-layer approach in reducing thermal stresses.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A084325, price code: A02, or contact project officer Robert C. Bill, (314) 263-1625.

0764 Thermography for Testing Composites Nondestructively: The state-of-the-art is reviewed

Army Materiel Development and Readiness Command, Alexandria, VA.

Dec 83 (G, K)

A report presents a review of thermographic techniques suitable for nondestructive testing of laminated composite materials. General information on contact and noncontact measurements is discussed in the report, which was prepared for the U.S. Army Aviation Research and Development Command. Emphasis is placed on non-contact-infrared methods, since they can be used for real-time observations. The report describes the state-of-art. Practical procedures are discussed in detail. In addition, present equipment available commercially for such test and important test parameters, which must be selected for observation and interpretation, are discussed.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A114392, price code: A03 or contact project officer Joe Pratcher (314) 263-1625.

0765 Thermoset/Thermoplastic Aromatic Polyamides for Composites: Pendent propargyl groups serve as latent cross-linking agents in a new series of polyamide resins

National Aeronautics and Space Administration, Washington, DC.

Jun 83 (H, J)

New aromatic polyamides are processed at a relatively low temperature, then heat-treated to attain the high softening temperature required when the polyamides are used as matrix resins in structural composites. The new polyamides are compatible with the organic fibers (such as duPont Kevlar (R) aramid fibers, or equivalent) often used as reinforcing agents in such composites. A new process incorporates a propargyl cross-linking agent at various levels along the back bone of an aromatic polyamide, to produce a polymer of high molecular weight that softens at a relatively low temperature (427 K) and subsequently 'sets up' when treated at a higher temperature (553 K).

FOR ADDITIONAL INFORMATION: Contact: Tech. Trasfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to : LAR-12723/TN.

Tile-Failure Analysis: Probability model assesses failure risk of systems with widely-varying loads and material strength

See 0909

Titanium Powdered Metallurgy Processing: Production process for titanium components is cost-competitive

See 0640

0766 Transport and Installation of Fibrous Insulation:

Two methods preserve the fiber orientation before and during installation

National Aeronautics and Space Administration, Washington, DC.

Nov 83 (D, H)

Two new techniques simplify the transport and installation of oriented-fiber thermal insulation. Other applications involving oriented fibers or loose fillings might also be able to utilize the methods. In one installation method, layers of uncured phenolic-impregnated batting in various shapes are wound around a mold, compressed, and the binder evaporated. The second method uses no resin. Instead, the insulation is compressed in a mold and saturated with water. The wet insulation is then frozen in the shipping container. After the frozen insulation is installed around the thruster, it is heated until the water is driven off.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20074/TN.

Tubular Braiding Rotor Spars: Helicopter main-rotor spar costs can be reduced by a third

See 0028

0767 Welding High-Temperature Components of Nuclear Plants: While a data base is being accumulated, the use of conservative interim design methods is recommended

Department of Energy, Washington, DC.

Dec 83 (D, G)

A report reviews the design of welded components that are exposed to high temperatures (about 1,050 F) in nuclear power plants. The report notes that established procedures for the control and evaluation of weldments for pressure vessels have an excellent performance history and serve well in most conventional plants. However, there is a growing view that a more detailed understanding of weldment behavior should be incorporated in the design process for elevated-temperature parts of nuclear plants. The report describes a method utilizing weld-efficiency factors for use with steady-state loading. It also describes methods that have application to the cyclic-load situation arising from

temperature changes in dissimilar welds. The methods can serve a useful interim function until the data required for a more complete analysis are available.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-016698, price code: A03.

0768 Wind-Resistant Filler for Tile Gaps: Tubular construction resists wind loads and heat

National Aeronautics and Space Administration, Washington, DC.

Jan 83 (H)

A filler developed for the gaps between insulating tiles on the Space Shuttle may also find application in industries that use tiles for thermal or environmental protection. The fill consists of tight-fitting ceramic tubes and fibrous alumina. The combination resists high wind loads while providing the requisite heat protection. The filler contains a 0.25-inch ceramic tube at the leading edge of the gap, backed by another ceramic tube 0.5 inch in diameter. Both tubes are filled with dense alumina mat. The tubes are encased in a ceramic fabric envelope, which also holds a lower-density alumina fiber.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div. P.O. Box 8757, BWI Airport, MD 21240. Refer to MSC-18966.

MEDICINE & BIOLOGY

0769 Animal Genetic Resource

National Institutes of Health, Bethesda, MD.

Sep 83 (E)

Many varieties of genetically defined animal models are currently available to researchers. A number of the models were developed internally at the resource. Many others were developed elsewhere and introduced into the resource's colonies at investigator request. The majority of the animals are maintained in a specific pathogen-free environment. Approximately 4,000 to 5,000 breeding animals are supplied each year to investigators around the world. The resource maintains one of the larger collections of rat mutants in the world. Breeding stock of the resource's models is provided to investigators free of charge. The requestor is required, however, to pay transportation charges.

FOR ADDITIONAL INFORMATION: Contact: Dr. William T. Watson, Small Animal Section, Veterinary Resources Branch, National Institutes of Health, Building 14A, Room 103, Bethesda, MD 20205; (301) 496-4481.

0770 Animal Studies Link Phenobarbital Usage During Pregnancy to Effects on Reproductive Function in Offspring

National Institutes of Health, Bethesda, MD.

Feb 83 (E)

Phenobarbital is capable of producing striking and permanent effects on the reproductive function in animal offspring exposed to the drug within the womb. This finding suggests that other tranquilizers and sedatives taken by women during pregnancy also may have delayed effects on the biologic functions of their offspring. Such drugs currently represent the major group of drugs prescribed to pregnant women.

FOR ADDITIONAL INFORMATION: Results were published in Science(Vol. 208, pp. 508-10), Pediatric Pharmacology(Vol. 1, pp. 55-62) and - Pediatric Research(Vol. 15, pp. 1488-1491).

0771 Antiviral Agent May Be Life-Saving for Certain Herpes Zoster Patients

Department of Health and Human Services, Washington, DC.

Dec 83 (E)

Vidarabine, a drug used to treat patients with herpes virus encephalitis, can also prevent the life-threatening complications of herpes zoster in immunocompromised patients, according to studies supported by the National Institute of Allergy and Infectious Diseases (NIAID). The Food and Drug Administration recently announced approval of this new use of the drug. Although the number of patients who may benefit from this treatment is small, Dr. Richard M. Krause, director of NIAID, stressed the importance of vidarabine as a life-saving drug and as a pioneer product in the long search for drugs effective against viral infections. Earlier NIAID-supported studies led to the initial approval of vidarabine as the first injectable drug for treatment of patients with a serious viral infection.

FOR ADDITIONAL INFORMATION: Contact: NIH News Branch, Building 31, Room 2B-10, Bethesda, Maryland 20205; (301) 496-2535.

0772 Bacterial Bioassay for Level 1 Toxicity Assessment

Environmental Protection Agency, Washington, DC.

Dec 83 (E)

Nitrifying bacteria were tested to determine their applicability as Level 1 bioassay organisms. Level 1 testing involves general bioassay and analysis procedures that will identify the presence of toxic material in a given waste stream. The toxicity of five metals and three organic toxicants to the nitrifying bacteria (Nitrobacter and Nitrosomonas) were determined and compared to other common bioassay organisms. In general, the bacteria exhibited comparable sensitivity for toxicants with affected substrate metabolism, but lower sensitivity for specific toxicants such as pesticides that affect the activity of nerve cells. The application of the bacterial bioassay was shown for two cases of Level 1 testing: a field study of a toxic industrial waste and its pretreatment, and an assessment study of the potential leachate problems for a flue-gas scrubber solid waste.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB83-182287, price code: A05. For other program information contact project officer, David T. Tingey, Environmental Research Laboratory, U.S. Environmental Protection Agency, Corvallis, OR 97330.

0773 Barley Helps Reduce Cholesterol

Department of Agriculture, Washington, DC.

Dec 83 (E)

Barley's many roles, in brewing beer, in breakfast foods, and as feed for stock, may now be expanding to include lowering cholesterol in chickens and pigs. Scientists found that 20 percent high-protein barley flour added to a corn-based diet lowered cholesterol in blood plasma 20 percent in chicks and increased their growth 20 percent. Egg yolks also had 20 percent less cholesterol when chickens were fed a freeze-dried culture filtrate of the fungus. Trichoderma Viride. Studies showed that diets of barley and fungal cul-

ture affect the activity of certain key enzymes in animal livers. These enzymes control the rate at which cholesterol is made and broken down into bile acids. Scientists are not sure of the chemical make-up of the cholesterol-lowering substances in barley and the fungal culture.

FOR ADDITIONAL INFORMATION: Contact: Warren C. Burger, Barley and Malt Laboratories, Agricultural Research Service, USDA, Madison, WI 53705, (608) 262-3355.

0774 Beta-Type Growth Factor Composition Affords Tissue Repair

National Institutes of Health, Bethesda, MD.

Feb 83 (E)

There is a continuing need for the promotion of rapid cell proliferation at the site of wounds, burns, diabetic and decubitus ulcers, and other traumata. A new invention by Dr. Michael B. Sporn of the National Cancer Institute, National Institutes of Health affords compositions for the promotion of cell proliferation in animals, especially fibroblast cells in human beings. The compositions have as their active ingredients, beta-type transforming growth factor and an activating agent. The activating agents of the invention are selected from at least one of epidermal growth factor (EGF) and alpha-type transforming growth factor. The method of topical administration of the compositions of this invention is by direct application to a burn, wound, or other traumata situs.

FOR ADDITIONAL INFORMATION: Contact: Office of Government Inventions and Patents, NTIS, 5285 Port Royal Road, Springfield, VA 22161; (703)487-4732. Refer to Patent Application 6-423203.

0775 Biological Hazards of NMMW Radiation: Publication surveys the hazards of the 100-to 1,000-GHz radiation

Army Materiel Development and Readiness Command, Alexandria, VA.

Apr 83 (E)

A survey of the recent literature on biological hazards of near-millimeter-wave (NMMW) radiation was completed. Thermal effects of exposure on eyes, reproductive organs, and other critical organs are reviewed. The highly controversial issue of possible nonthermal effects is also considered. Among the thermal effects, for example, the survey treats the decrease in skin penetration as the frequency of radiation increases. There are definite hazards, according to the survey.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A088467, price code: A03 or contact project officer Edward A. Brown (202)394-2755.

Biomass Model of Reservoir Fish and Fish-Food Interactions

See 0032

Biomass Model of Reservoir Fish and Fish-Food Interactions

See 0129

0776 Blood Cell Changes Predict Kidney Damage

Department of Agriculture, Washington, DC.

Oct 83 (C)

It has been determined that changes in red blood cells of sheep predict kidney damage. If developed by medical researchers, this new knowledge could provide an early warning system for kidney dysfunction in human beings. Using

an electron microscope as well as biochemical and blood studies, it was found that before acute kidney dysfunction sets in, red blood cells change their structure and form large numbers of bridges between the red blood cells. These cell-to-cell bridges can be easily seen under the powerful magnification of the electron microscope, and the changes occur in the blood before there is any other indication that kidney function has been impaired. More importantly, these bridges were detectable in relatively large numbers when only a small portion of a kidney was found to be damaged. Since morphological changes have been seen in the red blood cells of swine as well as sheep, researchers believe it is possible that the same phenomenon could occur in human beings.

FOR ADDITIONAL INFORMATION: Contact: Dr. Shirlee Meola, USDA, ARS-VTERL, College Station, Texas 77841; (703) 260-9339.

0777 Cancer Inhibitor Resembles Antibiotics Produced by Soil Bacteria

Department of Agriculture, Washington, DC.

Aug 83 (E)

Seeds of a poisonous plant called coffeebean, rattlebox and other names contain a potent cancer inhibitor, sesbanimide bears an obvious structural relationship to antibiotics such as cycloheximide. The structural relationship between sesbanimide and cycloheximide, which is produced with another antibiotic, streptomycin, by bacteria ordinarily found in soil, raises the question as to whether a microorganism or a higher plant actually produces sesbanimide.

FOR ADDITIONAL INFORMATION: Contact: Dr. A. M. Cowan, Technology Transfer Office, Northern Regional Research Center, Department of Agriculture, 1815 N. University Street, Peoria, IL 61604; (309) 685-4011.

A Computerized Water Management Tool: The instream flow incremental methodology

See 0130

0778 Data Files From The National Collaborative Perinatal Project Studies on Brain Disorders

Department of Health and Human Services, Washington, DC.

Dec 83 (E)

The National Collaborative Perinatal Project (NCP) was a 16-year longitudinal multidisciplinary research effort that sought leads to the etiologies of cerebral palsy, mental retardation, learning disorders, congenital malformations, minimal brain dysfunction, convulsive disorders, visual abnormalities, and communicative disorders. These studies related the events, conditions, and abnormalities of pregnancy, labor, and delivery to the neurological and mental status of the children of these pregnancies as the children grew and developed. The data files of the NCP contain information on over 58,000 women and their children, and these files can be made available to biomedical and behavioral researchers for independent investigative purposes. The National Institute of Neurological and Communicative Disorders and Stroke (NINCDS) currently provides the NCP study protocols, forms, and manuals used to collect NCP data to researchers for the use in making a preliminary determination of the appropriateness of the data for studies in their areas of interest.

FOR ADDITIONAL INFORMATION: Contact: Dr. Joseph S. Drage, National Institute of Neurological and Communicative Disorders and Stroke, Federal Building, Room 816B,

7550 Wisconsin Avenue, Bethesda, MD 20205, (301) 496-6701.

Development of Hormones to Stimulate Spawning in Exotic Fish Species

See 0036

0779 Development of a Carcinogen Assay System Utilizing Estuarine Fishes

Environmental Protection Agency, Washington, DC.

Jun 83 (E)

A project demonstrates the feasibility of employing small estuarine teleosts in laboratory assays of suspect carcinogens. The relatively low cost of maintaining such fish and their short latency period of only five to six months give this assay an economic advantage over traditional murine bioassay systems. Experience indicates that a requirement for success with such systems, however, is that the fish must be parasite-free and healthy, and their health must be carefully maintained during the course of the exposures.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number:PB83-136333, price code: A04 or contact J.A. Couch, Environmental Research Laboratory, Sabine Island Gulf Breeze, FL 32561.

0780 Diabetic Retinopathy Study Data Tapes Available

Department of Health and Human Services, Washington, DC.

Dec 83 (E)

The Diabetic Retinopathy Study (DRS), supported by the National Eye Institute, proved conclusively that photocoagulation reduces the risk of severe visual loss in people with advanced diabetic retinopathy by half. Data collected on each of 1,758 patients during the course of the 5-year study are recorded on magnetic computer tapes prepared by the DRS Coordinating Center.

FOR ADDITIONAL INFORMATION: Contact: Ms. Marsha Corbett, National Eye Institute, Office of Scientific Reporting, Building 31, Room 6A32, 9000 Rockville Pike, Bethesda, MD 20205, (301) 496-5248.

0781 DNA-RNA Data Bank

National Institutes of Health, Bethesda, MD.

May 83 (E)

An international data bank of DNA and RNA sequences is now available. The data bank, called GenBank, enables scientists to obtain the sequences of DNA and RNA molecules comprised of approximately 750,000 bases. Information in the data bank is being gathered at the Los Alamos National Laboratory. The purpose of the data bank is to avoid the duplication of data collection that might occur in a rapidly expanding field such as molecular genetics. Sequences of the nucleic acids in DNA and RNA are ordered lists of four types of smaller molecules called bases.

FOR ADDITIONAL INFORMATION: Contact: Dr. Howard Bilofofsky, GenBank, c/co Computer Systems Division, Bolt, Beranek, and Newman, Inc., 10 Moulton Street, Cambridge, MA 02238; (617) 497-2742.

Enzyme Pollution Biodetection Systems: Development of a field instrument

See 0445

0782 An Experimental Drug to Treat Genetic Blood Diseases is Unveiled

National Institutes of Health, Bethesda, MD.

Jun 83 (E)

Scientists recently reported that an experimental drug, 5-Azacytadine may help treat sickle cell anemia and beta-thalassemia. Both of these forms of anemia are considered incurable and the investigators emphasize that this approach to treatment is not a cure, but may, in the future offer relief from the disease symptoms to certain, carefully selected patients.

FOR ADDITIONAL INFORMATION: Contact: National Heart Lung & Blood Institute, Bldg. 31, Room 4A21; Bethesda, MD 20205; (301) 496-4236.

0783 Expert Computer Program Overhauled

National Institutes of Health, Bethesda, MD.

Oct 83 (A, C)

The knowledge base of INTERNIST-1, a prototype computer program designed to make multiple and complex diagnoses concerning internal medicine, is undergoing a massive overhaul of its reasoning code and data structure following the program's first formal trial on documented patient histories. Restructuring will give the second-generation program, called CADUCEUS (INTERNIST-II), the ability to recognize patterns formed by numerous and disparate pieces of information -- the fundamental deficiency documented in the trial. In recent months, researchers have worked to develop the second generation program, whose reasoning code and data structure are significantly different from its predecessor. The data and structure are derived from the original program, but they are richer in context. This allows the computer to explain diagnoses in terms that the physician can understand, which is critical if CADUCEUS is to reach its potential as a source of expert advice.

FOR ADDITIONAL INFORMATION: Contact: Dr. Jack Myers, University of Pittsburgh, 1291 Scaife Hall, Pittsburgh, PA 15261; (412) 624-2649.

0784 Fasting Hypoglycemia: A new cause is studied

National Institutes of Health, Bethesda, MD.

Aug 83 (E)

Fasting hypoglycemia, a fall in blood glucose after six or more hours, is an extremely rare condition, and is not to be confused with the highly controversial reactive or functional hypoglycemia. It can be caused by potentially more serious conditions such as tumors, inborn errors of metabolism, and autoimmune endocrine disease. A novel case puts forth another probable cause for the disorder. Through a series of specific tests, a patient was shown to have autoantibodies to the insulin receptor. When bound to the insulin receptor those antibodies mimicked the effects of insulin by lowering blood glucose levels. The research also stimulates additional questions, such as what mechanism determines whether the antireceptor antibody will have an insulin-mimicking or insulin-blocking effect.

FOR ADDITIONAL INFORMATION: Contact: NIH News Branch, Building 31, Room 2B-10, Bethesda, MD 20205; (301) 496-2535.

0785 Flexible Method for Analyzing Band Recovery Data

Department of the Interior, Washington, DC.

Aug 83 (A, E)

For several years a number of statistical procedures have been available for estimating survival and recovery rates from bank recoveries. While these procedures have proven

to be very effective, they encompass only a portion of the biologically reasonable models which may be used to describe band recovery data. A flexible computing algorithm has been developed which allows a biologist with limited computer programming abilities to specify his own model and to estimate the parameters from that model. Models which have been incorporated into this algorithm include: (1) Survival rates hypothesized to be a linear function of recovery rates, (2) survival rates hypothesized to be a linear function of a covariate (for example, temperature), (3) estimation of interval survival rates from banding at 2 times of the year, (4) estimation of reporting, harvest, and survival rates from recoveries of reward-banded and standard-banded birds. The program has been written in HP-FORTRAN language and can be used in either batch or interactive mode.

FOR ADDITIONAL INFORMATION: Contact: Director, U.S. Fish and Wildlife Service, Patuxent Wildlife Research Center, Laurel, Maryland 20708; (301) 776-4880.

0786 Frozen Embryo Bank Developed to Preserve Strains of Mice

National Institutes of Health, Bethesda, MD.

Oct 83 (C)

A frozen mouse embryo bank has been developed to preserve strains of mice needed in various research areas. The resource can provide laboratory animals for studies on genetics, cancer, immunology, reproduction and development, aging, blood, behavior, and neurobiology. Eventually the bank will preserve all 700 strains of mice now bred at the Jackson Laboratory. To date, more than 250,000 embryos are stored for each of the 48 lines of mice no longer bred at the laboratory. Recovery from the bank, gestation, and birth occur at the Jackson Laboratory. Researchers may purchase mice from the bank. The bank will refer investigators to breeders, if the requested strain of mice is available.

FOR ADDITIONAL INFORMATION: Contact: Dr. Larry E. Mobraaten, The Jackson Laboratory Bar Harbor, Maine 04609.

Germplasm Resources Information Network: Computers to Keep Track of Nation's Plant Resources

See 0037

Holographic Microscopy System: System achieves 2 micro m resolution throughout a 100-cm3 sample volume

See 0453

Implantable Drug Dispenser: Differential vapor pressure allows fine control

See 0059

Improved Monitor for Alpha Emission in Air: Instrument is compact, accurate, and quiet

See 0855

0787 Improving Vision With RF Energy: Corneal collagen is shrunk to improve vision

Department of Energy, Washington, DC.

Nov 83 (E)

Extreme cases of misshapen cornea, cases that cannot be corrected with lenses, may be treated in the future by the application of RF energy. The technique does not involve surgery, and may therefore have advantages over the corneal transplant alternative. Judiciously applied, the RF energy heats the cornea, shrinks its collagen fibers and thereby changes its shape so that it can focus light on the

retina. Unlike methods that apply heat by conduction, RF current heating is capable of reshaping the cornea with greater reproducibility and without significant damage to superficial tissue layers.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: LA-7155-MS, price code: A02 or contact James D. Doss, Los Alamos National Laboratory, MS-H844, Los Alamos, NM 87545; (505) 667-5753.

0788 Increased Risk of Heart Attack Found in Former Long Term Pill Users

National Institutes of Health, Bethesda, MD.

Feb 83 (E)

Women who use oral contraceptives for 5 years or longer carry an increased risk of heart attack which persists at least 9 years after pill use is stopped. This finding comes from the first study large enough to uncover such a relationship, and the investigators warn that the data should be interpreted with caution until the results are repeated elsewhere. In line with earlier reports, the researchers found that current use of oral contraceptives increases the risk of heart attack three to four times.

FOR ADDITIONAL INFORMATION: See the New England Journal of Medicine, Volume 305, Number 8.

0789 Infectious Disease Information System (IDIS)

Veterans Administration, Washington, DC.

May 83 (A, E)

IDIS was designed by the Veterans Administration to allow the coding and storage of virtually all information pertaining to a particular infection in a patient. These data for community acquired and hospital acquired infections are obtained and recorded by Infection Control Coordinators. IDIS produces a monthly update of antimicrobial susceptibilities for pathogens causing disease during the prior four months. The system is written in the COBOL programming language for implementation on a Honeywell H-2050 computer using the OS/2000 operating system.

FOR ADDITIONAL INFORMATION: Contact: Computer Products, Room 1006, NTIS, Springfield, VA 22161. Refer to PB83-131896.

0790 Insect Growth Regulator May Be Used For Cancer Treatment

Department of Agriculture, Washington, DC.

Mar 83 (E)

A chemical currently used to control insects could possibly be used to treat cancer. Diflubenzuron, or Dimilin, as the chemical is commonly called, has not only stopped the growth of melanoma tumors in mice, but has actually reduced tumor size as much as 22 percent in 24 hours. Untreated tumors can increase in size as much as 22 percent in 24 hours. Untreated tumors can increase in size as much as 60 percent in the same time period. Diflubenzuron has extremely low mammalian toxicity. Dimilin is currently used to control many kinds of insects, including the boll weevil. It is not a pesticide or poison, but a growth regulator that interferes with the insects' bodies. The chemical's action probably affects membrane permeability. Dimilin prevents the uptake of nucleosides which are the building blocks of nucleic acids. The chemical apparently interferes with tumor growth by making cell membranes in the tumor less permeable.

FOR ADDITIONAL INFORMATION: Contact: Dr. Richard Mayer, ARS Veterinary Toxicology & Entomology Research Lab.; (712) 260-9401.

0791 Interferon Produced in Patient with Rare Leukemia
National Institutes of Health, Bethesda, MD.

Jan 83 (E)

Scientists have discovered that white blood cells (lymphocytes) from a patient suffering from a rare leukemia can spontaneously produce interferon. The study of this case may provide clues into how interferon regulates some of the complex functions of the immune system.

FOR ADDITIONAL INFORMATION: The studies by Dr. John J. Hooks were reported in the January 1982 issue of the Journal 'Blood'.

A Kit for Detecting Bacteria and Viruses: Feasibility of the kit and its tests has been demonstrated

See 0459

Laser Surgery Mends Nerves

See 0062

0792 Magnetic-Field Dosimeter: Exposure of Individuals is sensed and recorded

Department of Energy, Washington, DC.

Nov 83 (E, K)

An instrument measures magnetic-field doses. It is intended for eventual use in studies of potential health hazards to people exposed to magnetic fields. The instrument demonstrates the feasibility of its basic concepts and points the way for future refinements. The basic sensing elements are three Hall-effect magnetic-field sensors oriented along three mutually perpendicular axes. The sensors are connected to the electronics package of the instrument by an umbilical cable. The sensors measure three orthogonal components of a magnetic field, thereby uniquely defining the field.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PNL-3546, price code: A03.

Measuring Radon Levels Indoors: Techniques are suggested and study results are reported

See 0857

Miniature Gamma-Radiation Sensor: Preliminary radiation and temperature tests are made

See 0858

0793 Mosquito Control Technique Using Monomolecular Films

Department of the Navy, Washington, DC.

Aug 83 (E, H)

A highly effective, nontoxic mosquito-control substance should be available for commercial use. The compound was developed after initial testing of monomolecular surface films for their usefulness in controlling oil spills. When he realized that these substances might also be effective in controlling mosquitos and, thus, began testing the substance in his laboratory. The substance, isosteral alcohol, successfully controlled mosquitos without harming other life forms in field tests. Immature mosquitos in the pupal and larval stage die from drowning as they come to the water's surface to breathe and the substance wets their breathing tubes.

FOR ADDITIONAL INFORMATION: Contact: D. McKinney, Naval Research Laboratory, Code 2610, Washington, D.C. 20375; (202) 767-2541.

Moving-Surface Follower Aids Microsurgery: Surgical implements are precisely positioned in moving tissue See 0064

Multinuclei NMR Spectroscopy Resource
See 0115

0794 Myoscan--Radiolabeled Fatty Acid for Applications in Nuclear Cardiology

Department of Energy, Washington, DC.
May 83 (E, J)

A radioiodinated fatty acid containing nonradioactive tellurium has been developed for the early detection of heart disease. Tissue distribution and imaging studies in animals have shown this agent to have unique biological properties which include high heart specificity, rapid blood clearance, low in vivo deiodination and prolonged retention in the heart muscle. The unique property of the tellurium fatty acid is the prolonged retention or trapping, which is a new concept. Rapid clearance from the blood leads to specific uptake of radioactivity in the heart muscle and high heart-to-blood ratios. The estimated radiation dose to humans calculated from animal data indicates that the absorbed whole body radiation dose from the ¹²³I agent would be only 0.054 rad/mCi and 0.1 rad/mCi for the kidneys. This agent appears superior to commercially available radioiodinated long-chain fatty acids, which show pronounced iodide loss, low heart-to-blood ratios, and rapid myocardial clearance. Principal applications include the detection, quantification, and evaluation of acute myocardial infarction and myocardial ischemia in coronary artery disease, and the potential evaluation of cardiomyopathies.

FOR ADDITIONAL INFORMATION: Contact: D.W. Jared, Oak Ridge National Lab, P.O. Box X, Oak Ridge, TN 37830; (615) 574-4192. Refer to 450/X/TN.

0795 Navy Develops Job-Related Physical Training Programs

Department of the Navy, Washington, DC.
Aug 83 (E)

SPARTEN (Scientific Program of Aerobic and Resistance Training Exercise in the Navy) is a total body fitness program currently being evaluated for potential Navy-wide use by exercise physiologists. The SPARTEN program offers a balanced plan of aerobic training for maintenance of health and progressive resistance training for optimal job performance and prevention of job-related injuries. Specific strength enhancement exercises include the bench press, shoulder press, knee extension, hip flexor, pull-up, two-arm curl, lat-pull, leg press, arm dips and sit-ups.

FOR ADDITIONAL INFORMATION: Contact: Naval Health Research Center, Technology Transfer Officer, P.O. Box 85122, San Diego, California 92138; (619) 225-2061.

0796 A New Three-Dimensional Picture of Penicillin Binding to its Enzyme is Developed

National Institutes of Health, Bethesda, MD.
Sep 83 (E, J)

The first molecular-level picture of penicillin binding to its bacterial enzyme receptor was developed by scientists at the University of Connecticut at Storrs. This three-dimensional picture could be invaluable to chemists wishing to make new penicillins or completely new families of antibiotics. The investigators used a technique called x-ray diffraction

analysis to construct the picture that revealed the three-dimensional shape of the large enzyme molecule. The analysis also showed the exact location where the penicillin molecule binds when it stops the normal functioning of the enzyme. The research team is now studying the enzyme's interaction with a series of newly made penicillins and completing a three-dimensional picture of the penicillinase enzyme.

FOR ADDITIONAL INFORMATION: The research findings were published in the October 1982 issue of Science.

0797 New 24-Hour Herpes Test for Pregnant Women and Newborns Developed

National Institutes of Health, Bethesda, MD.
Jul 83 (E)

A new 24-hour test to detect herpes simplex infections in pregnant women and their babies has been developed by scientists in the Infectious Diseases Branch of the National Institute of Neurological and Communicative Disorders and Stroke (NINCDS). The new test is almost 100 percent accurate and takes only one day to complete rather than the seven days required by most currently available tests. By establishing a diagnosis of herpes (or no herpes) near the time of delivery, the new test will help physicians decide whether to perform a cesarean section to prevent transmitting the infection to the newborn. The new test is simple enough that hospitals with virology labs can readily use it. FOR ADDITIONAL INFORMATION: The new test was described in the January 1983 issue of the Journal of Clinical Microbiology.

0798 NIAID Study Identifies Factors that Affect Outcome of Kidney Transplants

National Institutes of Health, Bethesda, MD.
Feb 83 (E)

Transplants from living relatives are known to be far more successful today than the more frequently performed ones that use kidneys from cadavers. According to the Kidney Transplant Histocompatibility Study (KTHS), 73 percent of the kidneys from living related donors still functioned one year after implantation. The study correlated the transplant outcomes with the characteristics of the donors, recipients and treatments using tables for graft and patient survival. The initial objective of the study was to determine what effect, if any, matching of donors and recipients for HLA-A and HLA-B histocompatibility antigens had on the probability of long-term graft survival.

FOR ADDITIONAL INFORMATION: For a qualitative summary of the analysis of the KTHS, contact Dr. Henry Krauer, Genetics and Transplantation Biology Branch, National Institutes of Allergy and Infectious Diseases, Bethesda, MD. 20205; (301)496-7551. The full study may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402 for \$28.00. The GPO stock number is 017-044-00036-2.

0799 NIDR Develops Screening Tests for Drugs That Cause Malformations

National Institutes of Health, Bethesda, MD.
Jul 83 (E)

Cultures of specific embryonic cells are promising tools for detecting chemical agents that are potential causes of birth defects, according to scientists at the National Institute of Dental Research (NIDR). Testing in animals for substances that cause congenital malformations (teratogens) is an expensive and slow process. NIDR investigators report that

their methods, which employ cultured cells from early chicken embryos and limb buds from mice or chicks, can be used to prescreen chemicals for teratogenic potential. When the scientists added drugs known to induce malformations to those cultures, they found that the drugs interfered with the cultures at teratogenic levels observed in the blood. In contrast, nonteratogenic drugs had no effect on the cultures at the same blood levels. These findings were reported in August 1981 at the Workshop on In Vitro Teratogenesis Testing held in Hot Springs, Arkansas, and were published in *Teratogenesis, Carcinogenesis and Mutagenesis* in December, 1982.

0800 NIDR/FDA Microbial Information System

Department of Health and Human Services, Washington, DC.

Nov 83 (A, E)

A variety of computer programs for microbial data management and data analysis are currently available to researchers through the Microbial Information System (MICRO-IS) of the National Institute of Dental Research (NIDR) in Bethesda, MD, with joint funding and participation by the Food and Drug Administration (FDA). MICRO-IS, also a data bank, contains information on more than 100,000 strains of numerous species of microorganisms. Microbiologists from around the world have contributed data. Compilation of these data is an important but secondary use of MICRO-IS. The major value of the resource is to help scientists organize, manage and analyze their own data. MICRO-IS, a comprehensive information system used to create data files and manipulate microbial strain data, can process queries of simple or multiple data sets. The system has been used mainly to analyze voluminous microbiological data. It includes a probabilistic identification program that aids microbiologists in rapid computer-assisted identification of unknown microbial isolates. Programs have been developed to retrieve and analyze data for a variety of purposes. The MICRO-IS system of coding descriptors for computer input of information on bacteria, protozoa, fungi, and algae has gained international attention and has been adopted as the standard coding method for microbial data by a number of organizations in the United States and abroad.

FOR ADDITIONAL INFORMATION: Contact: Dr. Micah I. Krichevsky, Chief Microbial Systematics Section, National Institute of Dental Research, National Institutes of Health, Building 10, Trailer A, Room 1A04, Bethesda, Maryland 20205; (301) 496-9750.

0801 Oxygen Fails to Sensitize Cancer to Radiation

National Institutes of Health, Bethesda, MD.

Oct 83 (C)

Contrary to numerous published reports, hyperbaric oxygen does not enhance the effectiveness of radiation treatment for at least one type of animal cancer and may actually stimulate the cancer's growth. Cultured rat cells from a malignant brain tumor showed no increased sensitivity when irradiation was accompanied by exposure to oxygen in a pressurized chamber. Instead, a small but statistically significant increase was recorded in the number of tumor cells subsequent to the treatment. These results were unexpected and bring into question the potential usefulness of hyperbaric oxygen as a radiation sensitizer in the treatment of gliomas. The research also raises questions concerning the efficacy of certain radiation sensitizing drugs such as metronidazole that have biological effects similar to those of molecular oxygen. The research was originally intended to

define the radiation dose-oxygen pressure relationship that would destroy the maximum number of malignant glioma cells.

FOR ADDITIONAL INFORMATION: Contact: Dr. John R. Kapp, University of Mississippi, Department of Neurosurgery, 2500 N. State Street, Jackson, Mississippi 39216.

0802 Paget's Disease of Bone

National Institutes of Health, Bethesda, MD.

Aug 83 (E)

The first comprehensive patient brochure on Paget's disease of bone, an ailment which affects as many as three million Americans over age 40, has been issued by the National Institute of Arthritis, Diabetes, and Digestive and Kidney Diseases (NIADDK). It outlines the latest accepted methods of diagnosing and treating the disease. Paget's disease of bone, technically known as 'osteitis deformans,' is a chronic disease of the skeleton with abnormally rapid bone turn-over.

FOR ADDITIONAL INFORMATION: Contact: Paget's Disease Foundation, Box 2772, Brooklyn, NY 11202.

Peritoneal Drug Delivery for Special Diabetics

See 0067

0803 Plasmid Reference Center is Resource for Bacterial Plasmid Cultures

Department of Health and Human Services, Washington, DC.

Nov 83 (E)

The Center is a central resource for the acquisition, maintenance, and distribution of prototype bacterial plasmid cultures. Bacterial plasmids are relatively small DNA molecules, compared to the chromosomal DNA. Some carry genes for resistance to antibiotics and other drugs. A single plasmid may enable bacteria to resist tetracyclines, streptomycin, chloramphenicol, and sulfonamides, an ability called multiple drug resistance. More than 900 specific plasmid and plasmid-related cultures are available. The collection mainly comprises the classical plasmids carried by *Escherichia coli*. Also included are descendants of the first DNA recombinant plasmids developed by Dr. Stanley N. Cohen of Stanford University and Dr. Herbert Boyer of the University of California at San Francisco. A set of *Staphylococcus aureus* prototype plasmids is also available. A number of plasmid cultures have been assembled in the form of kits for specific purposes. Production of artificial mutants by the transposon mutagenesis technique is another area in which plasmids from the Center are being utilized. The center also maintains the Nomenclature Registry, which centralizes the assignment of nonconflicting plasmid prefix designations, allocates blocks of transposon and insertion sequence numbers, and reviews other terminological problems.

FOR ADDITIONAL INFORMATION: Contact: Dr. Ester M. Lederberg, Director, Plasmid Reference Center, Department of Medical Microbiology, Sherman Fairchild Science Building, Stanford University School of Medicine, Stanford, CA 94305; (415)497-1772.

Predicting Biological and Physical Effects of Reduced Flow

See 0844

0804 Reagent Resource

National Institutes of Health, Bethesda, MD.

Jun 83 (E)

A variety of allergenic, immunological, and viral research reagents are currently available to biomedical researchers from the NIH National Institute of Allergy and Infectious Diseases (NIAID) in Bethesda, Maryland. Plant and insect allergens; a variety of microbial and parasite antigens; as well as mycoplasma species and antisera, myxoviruses, hepatitis viruses, arbovirus grouping fluids, and interferon standards are available.

FOR ADDITIONAL INFORMATION: Contact: Mrs. Sylvia Cunningham, Research Resources Section, EAP, National Institute of Allergy and Infectious Diseases, Westwood Building, Room 7A-03, Bethesda, MD 20205; (301) 496-7036.

0805 Researchers Develop Autoantibodies That Mimic Autoimmune Response

Department of Health and Human Services, Washington, DC.

Nov 83 (E)

Researchers have developed monoclonal autoantibodies that mimic the autoimmune response believed by some authorities to intensify the effects of juvenile insulin-dependent diabetes mellitus (IDDM), one of many human diseases accompanied by a dysfunction of the body's natural defense mechanisms. The monoclonal autoantibodies have already been used with animal and human tissue to study IDDM. No one has yet identified the factors that naturally trigger the production of such autoantibodies, which are thought to damage normal tissue, but one possible cause is viral infection. Research has produced mouse monoclonal autoantibodies that react with healthy cells from the pancreas, pituitary, and gastric mucosa; such autoantibodies are replicates of those produced naturally by mice with virus-induced diabetes. The cross-reactive autoantibodies apparently recognize a common target on animal and human cells, supporting the idea that an autoimmune response similar to the one documented in diabetic mice, may occur in other animals and in humans with the disease. The cloning method is also being applied by the NIDR researchers to the production of human autoantibodies present in newly diagnosed patients with IDDM.

FOR ADDITIONAL INFORMATION: Contact: Dr. Abner L. Notkins, National Institute of Dental Research, Laboratory of Oral Medicine, Building 30, Room 121, NIH, Bethesda, MD 20205; (301)496-4535.

0806 Researchers Develop Unique System For Drug Therapy

Department of Agriculture, Washington, DC.

Nov 83 (E)

Scientists with the U.S. Department of Agriculture have found that red blood cells can be used to store and transport drugs in a unique system of drug delivery. Blood is taken from animals and the red blood cells are isolated. Then the cells are placed in a dialysis bag and made to swell until microscopic pores develop in the cell membrane. At this point, the red blood cells are removed from the bag and mixed with a drug. Salt concentration of the cells is restored and the cells then shrink to normal size, the small pores close and the drug is trapped inside. The red blood cells containing the drug can be remixed with whole blood and injected back into the animal where they will circulate freely and maintain a therapeutic drug level for days or even weeks. Further studies may lead to a number of practical applications for this system. In both humans and animals, carrier red blood cells may be a means of using

drugs that are either highly toxic or have a short useful life in the body. Medical people will be able to sustain optimum levels of drugs for weeks at a time without frequent injections.

FOR ADDITIONAL INFORMATION: An article detailing this research appeared in the American Journal of Veterinary Medicine, vol. 43, no. 12, page 2210. For licensing information, refer to Patent 4,327,710 and Patent 4,389,209 at the Office of Government Inventions and Patents, National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161, (703)487-4732.

0807 Rimantadine and Amantadine Studies in Preventing Influenza A

National Institutes of Health, Bethesda, MD.

Mar 83 (E)

Two related drugs, amantadine and rimantadine, effectively protect against influenza A infection, but rimantadine produces significantly fewer side effects according to a recent study. These results suggest that rimantadine is the drug of choice for prevention from influenza A. Both rimantadine and amantadine were effective in preventing influenza-like illness, defined as cough and/or fever, and at least two of the following--symptoms sore throat, headache, or muscle aches. When compared with placebo, rimantadine reduced the rate of illness 65 percent and amantadine reduced the rate 78.2 percent.

FOR ADDITIONAL INFORMATION: Findings of this study were reported in the Sept. 2, 1982, issue of the New England Journal of Medicine.

0808 Scientists Develop Simplified and Highly Sensitive Tests to Identify Malaria Parasites in Mosquitoes

National Institutes of Health, Bethesda, MD.

Jul 83 (E)

A scientific team from the National Institute of Allergy and Infectious Diseases (NIAID) and New York University (NYU) has developed tests that can detect malaria parasites in infected mosquitoes. The tests are radioimmunoassays and were developed while researchers were working on a malaria vaccine. Proven successful in the laboratory and with wild-caught mosquitoes, the assays could improve the understanding of the epidemiology of malaria. Until now, the only way to detect sporozoites in the mosquito was by hand dissection and microscopic examination of the tiny salivary glands of individual freshly caught mosquitoes. The new techniques simplify detection of malaria parasites since they rely on readily automated procedures based on immunologic principles (the reaction between antigens and antibodies).

FOR ADDITIONAL INFORMATION: This study was reported in Nature (Oct. 21, 1982) by Drs. Gwadz and Collins, and their colleagues at NYU, and presented at the 31st Annual Meeting of the American Society of Tropical Medicine and Hygiene in November.

0809 Scientists Understand the Function of Molecules by Developing a New Computer Program

National Institutes of Health, Bethesda, MD.

Sep 83 (E, J)

As scientists work to unravel genetic codes and protein structures, they need a quick, easy, inexpensive method to compare a nucleic acid or protein sequence produced in their labs to other known sequences. A computer program has been developed to search specialized data banks, and compare one sequence of a molecule or part of a molecule

to other known sequences, to point out similar segments between the sequences compared. The program can compare the test sequence to all sequences in the entire Protein Data Bank of the National Biomedical Research Foundation or the Los Alamos Nucleic Acid Data Base. The method results in a substantial reduction in the time required to search a data bank, and it does so with minimal loss in sensitivity. The reduction in time is also a reduction in cost.

FOR ADDITIONAL INFORMATION: Contact: NIH News, Building 31, Room 2B-10, Bethesda, MD 20205; (301) 496-2535.

0810 Sodium Transport Found to be an Effective Diagnostic Tool for Essential Hypertension

National Institutes of Health, Bethesda, MD.

Jan 83 (E)

A simple laboratory test to identify persons who have or will develop essential hypertension (high blood pressure of unknown cause, found in almost nine percent of the general population) may result from research on red blood cell membranes. It was found that a transport system that normally carries sodium in and out of the red blood cells is twice as active in individuals with essential hypertension as in individuals with high blood pressure secondary to another disorder. This finding may lead to the development of a simple laboratory test that will enable a physician to pinpoint the type of hypertension a patient has, without submitting him or her to extensive testing.

FOR ADDITIONAL INFORMATION: Contact: Dr. Tosteson or Dr. Canessa at Harvard Medical School, Boston, MA.

0811 Tests For Assessing Inner-Ear Dysfunction

Department of the Air Force, Washington, DC.

Dec 83 (E)

Quantitative tests of vestibular (inner-ear) and visual-motor function have been developed. Previous clinical tests for assessing inner-ear dysfunction were time-consuming, often painful and uncomfortable, and typically nonrepeatable; as a result, these tests were of little value in diagnosis and treatment. Testing procedures were developed using low-intensity angular accelerations visual tracking procedures, and online computer analysis techniques that have yielded quantitative and highly repeatable assessments of inner-ear and oculomotor function. This technical development has been completed, validated and published. The methods have been copied commercially and implemented worldwide in the clinical field of otolaryngology. No patent will be taken, so the method will remain in the public domain.

FOR ADDITIONAL INFORMATION: Contact: Dr. James W. Wolfe, USAF School of Aerospace Medicine/NGE, Brooks AFB, TX 78235, (512) 536-3201.

0812 Tissue-Culture Method of Cloning Rubber Plants: By adjusting the culture medium, an excised shoot tip can produce up to 50 identical guayule plants

National Aeronautics and Space Administration, Washington, DC.

Dec 83 (E)

The guayule plant, a high-yield rubber plant, can be cloned by a tissue-culture method to produce multiple new plants that mature quickly. With this method many clones can be bred from a single parent, and each clone can then be rooted and transplanted to soil where it will grow and mature. The method preserves a desired genetic identity (genotype), so that the clones should produce as prolifically

as their parents if planted in the same environment. The small shoot tips, the most regenerative parts of the plant, are removed by microscalpels and placed on slants of sterilized tissue-culture medium. The culture medium contains water, agar, minerals, sucrose, thiamin hydrochloride, and the cytokinin benzylaminopurine (BAP).

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15756/TN.

0813 Toxicokinetics of Inhaled Gases

Department of the Air Force, Washington, DC.

Aug 83 (E)

Physiological models have been developed which allow computer simulation of the uptake, distribution, metabolism, and excretion of potentially toxic gases. These models allow more accurate prediction of the effects of the type and route of exposure, the synergistic and antagonistic effects of other chemicals, and the scale-up of animal data to man. The inhalation models have been developed and are being validated. New models for analyzing dermal, intraperitoneal, and gastric uptake; predicting the effects of anticholinergic chemicals; and integrating thermal regulation are ongoing. These physiological models and the simulation software can be used to perform toxicokinetic studies of any gas when the physiological coefficients are known.

FOR ADDITIONAL INFORMATION: Contact: Lt. Col. Michael G. MacNaughton, Aerospace Medical Research Laboratory, TH, Wright-Patterson AFB OH 45433; (513) 255-5740.

0814 Toxicology of High Energy Synthetic Fuels

Department of the Air Force, Washington, DC.

Sep 83 (E)

The toxicology of the synthetic high energy cruise missile fuels was determined using long-term inhalation studies and animal performance measurements. JP-10, high density synthetic propellant, is a fuel composed solely of exotetrahydrodi(cyclopentadiene) which will be used in the air launched cruise missiles and possibly other ramjet engines of the future. Safe exposure criteria were suggested for workers using these fuels and emergency exposure limits were recommended for designing accident response procedures. The exposures have been completed and interim criteria have been recommended. The data base on JP-10 is applicable to all uses with potential worker exposure.

FOR ADDITIONAL INFORMATION: Contact: Lt Col Michael G. MacNaughton, Air Force Aerospace Medical Research Laboratory/TH, Wright-Patterson AFB OH 45433; (513)-255-5740.

0815 Toxicology of Hydrazine Type Fuels

Department of the Air Force, Washington, DC.

Aug 83 (E)

An extensive data base on the toxicology of the hydrazine type missile propellants has been generated for use in establishing human exposure limits, designing occupational medicine programs, and developing pollution control strategies. This data base was the result of exhaustive animal studies on the three hydrazine fuels: hydrazine, monomethylhydrazine, and unsymmetrical dimethylhydrazine. These fuels are used in AF and NASA missiles, the Space Shuttle, the F-16 fighter, and as an oxygen scavenger in large boilers on Navy ships. These data were critical in setting standards for human exposures to the hydrazine compounds.

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The data are applicable for many civilian situations that involve the use of hydrazine compounds.

FOR ADDITIONAL INFORMATION: Contact: Lt. Col. Michael G. MacNaughton, Aerospace Medical Research Laboratory/TH, Wright-Patterson AFB OH 45433; (513) 255-5740.

0816 Vaccine Being Tested Against Bacterial Disease of Fish and Man

National Institutes of Health, Bethesda, MD.

Mar 83 (E)

A vaccine against the most prevalent infectious organism in freshwater aquatic animals, an organism that also causes serious illness in man worldwide, is undergoing tests at Louisiana State University (LSU). The bacterium *Aeromonas hydrophila* may cause convulsions, coma, and death in freshwater fish. The same bacterium may cause septicemia, liver abscess, and diarrhea in man. The organism also causes secondary infections in individuals with reduced immune response and in those with cancer. The vaccine is composed of toxoids prepared from toxins of the bacterium. If successful, the vaccine could be a major boon for the freshwater fish industry.

FOR ADDITIONAL INFORMATION: Contact: Dr. Robert L. Amborski, Louisiana State University, Baton Rouge, LA.

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0817 Automated Temporary Roof Support (ATRS) For Low Coal

Department of the Interior, Washington, DC.

Jun 83 (D)

There was a need to eliminate the need for roof bolter operators and their helpers to work under unsupported roof while setting or removing temporary supports before or during the roof bolting cycle. An automated temporary roof support (ATRS), was developed that can be carried from place to place on the drill head of a single, fixed-head roof bolting machine. The ATRS was tested and no operating or maintenance problems were encountered.

FOR ADDITIONAL INFORMATION: Contact: Charles T. Chislaghi, Bureau of Mines, Pittsburgh Research Center, P.O. Box 18070, Pittsburgh, PA 15236; (412)675-5567.

0818 Automatic Fire Protection Systems for Underground Fueling Areas

Department of the Interior, Washington, DC.

Mar 83 (D)

A research objective was to develop a system which will effectively detect and extinguish fires in underground fueling areas while also providing a warning for nearby miners. A system involving optical fire sensors, automatically-released dry chemical and aqueous film-forming fluid (AFFF) fire suppressants, and automatic alarms was designed from off-the-shelf, state-of-the-art components, and was in-mine tested at two mines in the two typical underground fueling area situations: fuel transfer areas and fuel storage areas. The system consists of cross-zoned, ultraviolet flame sensors used for quick response to fire, and a dual-agent fire suppression subsystem. A dry chemical is used.

FOR ADDITIONAL INFORMATION: Contact: Guy A. Johnson or William H. Pomroy, Bureau of Mines, Twin Cities Research Center, 5629 Minnehaha Avenue South, Minneapolis, MN 55417; (612) 725-4576.

0819 Borehole Mining of Deep Phosphate Ore

Department of the Interior, Washington, DC.

Apr 83 (D)

The feasibility was tested of hydraulic borehole mining for the recovery of phosphate ore from the deep, water-saturated deposits of northeastern Florida. Hydraulic borehole mining can remove underground ore deposits that cannot be economically mined by the usual open pit or underground methods. It is environmentally compatible.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB82-257484, price code:A10 or contact Dr. George A. Savanick, Twin Cities Research Center, 5629 Minnehaha Avenue South, Minneapolis, Minnesota 55417; (612) 725-4543.

0820 Cartographers Examining Automated Methods of Map Generalization and Displacement

Department of Army, Washington, DC.

Feb 83 (A)

Studies into the realm of the subjective cartographic processes by researchers provides needed information for the development of an intelligent digital cartographic system. Cartographic license, the freedom to adjust, add, or omit map features within allowable limits, mean that the appearance of a map is dependent upon the cartographer who produces it. Researchers are studying two subjective aspects of map production that fall in the domain of 'cartographic license': line generalization and feature displacement. A three-phase effort to address the subjective aspect of map production has begun. A series of technical reports will be generated for each task in the study phase.

FOR ADDITIONAL INFORMATION: Contact: Mr. Douglas Caldwell, U.S. Army Engineer Topographic Laboratories, ETL-TD-MA, Fort Belvoir, VA 22060; (703)664-3722.

0821 Cost Analysis Computer Model for Uranium In-Situ Leach Mining

Bureau of Mines, Washington, DC,

Feb 83 (D)

A computer model and an associated data base was developed which will allow users to supply data applicable to a specific mining site in order to estimate total capital and operating costs for a potential in-situ mining operation at the site. The model requires a minimal amount of input from the user. The data input must be known or estimated information about a potential in-situ mining operation. The computer model uses a process-engineering approach and determines the total capital and operating costs for the life of the Project.

FOR ADDITIONAL INFORMATION: Contact: William C. Larson, U.S. Bureau of Mines, Twin Cities Research Center, 5629 Minnehaha Ave. South, Minneapolis, MN 55417; (612)725-3464. Refer to No. 159.

0822 Database Has Been Developed to Aid Water Suppliers

Department of Agriculture, Washington, DC.

Nov 83 (D)

Any project that concerns the nation's water supplies now can have instant access to 50 years of hydrologic data compiled by researchers of the US Department of Agriculture's (USDA) Agricultural Research Service (ARS). All that is required is a quick REPHLEX ... RETrieval Procedures for HydroLogic Data from ARS EXperimental Watersheds. REPHLEX is a new computer system for gaining direct tele-

phone access to the ARS Hydrologic Data Bank stored at the USDA's Washington Computer Center (WCC) in the District of Columbia. The data bank primarily contains precipitation and runoff records from approximately 300 watersheds around the U.S. For many watersheds, the Bank also includes information on land use, vegetation and cover conditions as well as soils, topography, geology and climatological data.

FOR ADDITIONAL INFORMATION: Contact: Stephen Berberich, Agricultural Research Service, Building 003, Room 250, BARC-W, Beltsville, MD 20705; (301) 344-3550.

0823 Determination of Oil Distribution for Tertiary Recovery: Resistivity measurements of oil and brine formations between wells enables the determination of oil-saturation distribution

Department of Energy, Washington, DC.

May 83 (C, K)

A method involving resistivity measurements and the use of equations, which relate resistivity to oil and brine saturation, has provided accurate oil saturation distributions for a model petroleum reservoir. Conventional methods (core analysis, well logging, and material-balance analysis) provide oil-saturation estimates at the wellbore, as opposed to oil-saturation distributions within the reservoir that are more useful to tertiary oil recovery.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,281,289 which is available from: Commissioner of Patents, Washington, DC 20231 for \$1.00. For licensing information, contact: Office Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

0824 Directional Drilling for Fossil Energy Sources: Developmental needs in equipment and procedures are identified

Department of Energy, Washington, DC.

Nov 83 (C, D)

Directional drilling -- a means of reaching production wells in skewed directions from the vertical wellbore - has experienced a relatively slow growth because of the high costs and reduced penetration rates. Because of these obstacles, directional drilling has been chiefly limited to offshore operations. With advances in drilling techniques and improvements in hardware, however, this technology holds the promise of opening up as yet unexploited sources of energy, such as methane from coal seams, heavy-oil and tarsand deposits, in situ coal gasification, in situ shale/oil recovery, and others.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-017053, price code: A05. For information not in the report, contact James R. Kelsey, Sandia National Laboratories, Division 9741, Albuquerque, NM 87185; (505) 844-6968.

Dual Gamma Device Developed to Analyze Materials

See 0442

0825 Dynamic Rating Curve Model (DYNMOD)

Department of Commerce, Washington, DC.

Jul 83 (A, D)

DYNMOD computes the stage-discharge relation including the hysteresis (loop) effect which can be significant in mild sloping rivers (effective hydraulic slope less than 0.001). The discharge hydrograph is computed for an observed stage hydrograph or the stage hydrograph is computed

from a specified discharge hydrograph. DYNMOD is based on the complete one-dimensional unsteady flow equations, in which spatial derivatives are approximated with time derivatives using the assumption of kinematic flow. This modified form of the unsteady flow equations is used to determine the energy slope(s) to be used in the Manning Equation, which functions as the math model of the relation between stage and discharge for unsteady flows. Applications are in stream gauging or computing stage hydrographs from hydrologic (storage) routing techniques based on a single-value rating in rivers with a noticeable loop-rating. The program was written in FORTRAN IV for use on IBM 360/195, but has been used on a variety of computers with little or no modifications. DYNMOD is available on magnetic tape (9 track, 1600 bpi, 80 block size) with written documentation.

FOR ADDITIONAL INFORMATION: Contact: Dr. Robert A. Clark, National Weather Service, NOAA, Office of Hydrology, W/OH, 504 Gramax Building, Silver Spring, Md. 20910; (301)-427-7658.

0826 Dynamic Wave Operational Model (DWOPER)

Department of Commerce, Washington, DC.

Jul 83 (A, D)

The computer program, DWOPER, routes unsteady flow using the dynamic wave method in a river system consisting of either a single channel, dendritic (three-type) configuration, or bifurcating due to islands, bypasses, estuarial networks. DWOPER is capable of accurately simulating unsteady subcritical flows in river systems where storage routing methods are inadequate due to the effects of backwater, tides, and mild channel bottom slopes. The model is based on the complete one-dimensional St. Venant equations and belongs to the category of dynamic wave flood routing models. The program was written in FORTRAN IV for use on IBM 360/195, but has been used on a wide variety of similar size computers with little or no modifications. FOR ADDITIONAL INFORMATION: DWOPER is available on 9 track, 1600 bpi, magnetic tape with written documentation. Contact: Robert A. Clark; National Weather Service Office of Hydrology, NOAA, W/OH; 504 Gramax Building; Silver Spring, Md. 20910; (301)-427-7658.

0827 Early Detection of Geothermal Aquifers: Chemical logging prevents damage to geothermal wells and contamination of freshwater aquifers

Department of Energy, Washington, DC.

Mar 83 (C, K)

A chemical log of the ratio of the concentrations of calcium to carbonate and to bicarbonate ions in return drilling fluid can be used as an early indicator of geothermal aquifers. Chemical logging is simply a repeated analysis of the drill return fluid taken at various depths of the advancing drill. Sample analysis can be performed by any suitable analytical technique. The analysts should look for the increasing ratios of calcium-to-carbonate and calcium-to-bicarbonate ions. The increase is an indicator that the drill is approaching a geothermal formation. Although the ion concentrations may vary from site to site, the measurement is relative and therefore not sensitive to such variations.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,306,879, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1. For licensing information,

tion, contact: Office of Assistant General Counsel for Patents, U.S. DOE, Washington, DC 20585.

Flexible Method for Analyzing Band Recovery Data See 0785

0828 Formulas for Precise Transverse Mercator Projection: A new method Yields precise geodetic maps

National Aeronautics and Space Administration, Washington, DC.

Jun 83 (J)

A new method for producing geodetic maps is not only easier to use than older methods but is also more precise. The new technique is a simplified method for computing the transverse Mercator projection, points on the surface of Earth are projected conformally onto a cylinder that is tangent at a principal meridian (including both poles). The cylinder then cut and flattened to form a planar map. The new method makes use of a set of formulas that connect coordinates of points on an oblate-spheroid-shaped Earth to rectangular map coordinates. The formulas are a new generalization of the previously known formulas for a spherical Earth. The formulas are in the form of conjugate harmonic series in odd powers of the spheroidal latitudinal eigenfunction and odd harmonics of the sine and cosine of the longitude. Tables of the calculus of the spheroidal latitudinal eigenfunction and related functions, and power series for these functions have been developed. Besides their use in mapmaking, the functions can be applied to the design of streamlined structures-for example, when distance along an ellipsoidal surface requires a simple analytic expression.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to : NPO-15409/TN.

0829 Fracture Dewatering to Minimize Groundwater Interference with Underground Coal Mining

Department of the Interior, Washington, DC.

Apr 83 (D)

A method was developed for control of groundwater inflow to chronically wet sections of underground coal mines, in order to reduce groundwater interference with mining activity and to minimize acid mine drainage. The dewatering method removes large volumes of the stored groundwater through high-capacity pumping from a minimal number of wells placed strategically on fracture traces (the surface expressions of fractured rock zones).

FOR ADDITIONAL INFORMATION: Contact: Robert D. Schmidt, Twin Cities Research Center, 5629 Minnehaha Avenue South, Minneapolis, MN 55417; (612) 725-3461.

Geothermal-Well Design Handbook: A straightforward procedure allows the determination of economic feasibility and the comparison of alternative approaches See 0336

0830 Heat Activated Stench Gas-Tracer Gas Mine fire Warning System

Department of the Interior, Washington, DC.

Apr 83 (D)

A system who developed to reduce fire warning time and avoid activation of false alarms in underground mines. A heat activated stench/tracer gas system was developed which automatically releases the gas mixture into the mine ventilation air. A disc is used to seal the contents of a canister. A low-temperature alloy designed to melt a predetermined temperature is used to restrain a spring loaded

plunger. All miners on downstream ventilation are warned of a fire by the stench gas and know to evacuate the mine.

FOR ADDITIONAL INFORMATION: Contact: Edward D. Thimons, Pittsburgh Research Center, Bureau of Mines, P.O. box 18070, Pittsburgh, PA 15236; (412) 675-6683.

0831 High-Resolution Subsurface-Interface Radar: Mathematical technique yields more accurate information about depth of soil layers

National Aeronautics and Space Administration, Washington, DC.

Apr 83 (B, K)

Homomorphic deconvolution signal processing can enhance the information obtained in high-resolution soil-depth measurements by radar. The proposed technique is expected to increase the accuracy with which soil-layer depths are gaged. The intended use is with subsurface-interface radar sounding, in which the subsurface features of soils are mapped. Although homomorphic deconvolution demands considerable data processing beyond that ordinarily required for radar returns, it yields sharper resolution.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div., P. O. Box 8757, BWI Airport, MD 21240. Refer to KSC-11212.

0832 High-Temperature Turbodrill: Directional drilling system penetrates hot granite in deep geothermal wells

Department of Energy, Washington, DC.

Aug 83 (D)

A recently-developed, high-temperature-rated turbodrill serves as the critical component in directional drilling systems designed to drill in deep, hot-granite formations. Successful field operations have demonstrated that the turbodrills are capable of drilling to 15,200-ft depths and at rock temperatures up to 630. Two sizes of these downhole drilling motors were developed: 7 3/4-in. and 5 3/8-in. diameter units for directional drilling in 12 1/4-in. and 8 3/4-in. diameter holes, respectively. A basic turbodrill design was first modified to attain the very high temperature requirements.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-009712, price code: A03. For information not provided in the report, contact J. C. Rowley, Los Alamos National Laboratory, University of California, P.O. Box 1663, MS J-979, Los Alamos, NM 87545; (505) 667-7811/1378.

0833 The Hydraulics of Diamond Bits: Pressure data reveal that a significant amount of hydraulic energy is consumed on approximately 8 percent of the total bit area

Department of Energy, Washington, DC.

May 83 (F, G)

Two conventional, natural-stone surface set diamond bits 7-7/8 in. in diameter were instrumented and used to drill shale in laboratory-controlled tests at simulated downhole conditions, to determine the distribution of pressure and hydraulic energy on the face of the bits, pump-off forces, drilling performance, and horsepower requirements. One bit was a soft-to-medium/hard formation bit with a forced-flow design. Adding more weight-on-bit to equal the pump-off force causes significant increases in the penetration rate without damaging the bit.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-007820, price code: AO8.

0834 Improved Mine Stench Fire Warning System

Department of the Interior, Washington, DC.

Aug 83 (D)

Research was conducted to improve the safety, reliability and overall effectiveness of mine stench warning systems and to provide a means of remote control stench injector operation. Industrial gas odorants were analyzed for their suitability for use in mine stench warning systems. A prototype stench injector capable of precise flowrate control was designed, fabricated, and tested using the odorant chosen as having the most favorable properties. Based on the results of the field tests, a second generation injector was developed. The second generation unit features optional remote control operation, and in addition, is simpler to refill and is less expensive than the original injector.

FOR ADDITIONAL INFORMATION: Contact: William H. Pomroy, Twin Cities Research Center, Bureau of Mines, 5629 Minnehaha Avenue South, Minneapolis, MN 55417; (612) 725-4500.

0835 Instream Water Temperature Model

Department of the Interior, Washington, DC.

Jul 83 (A, D)

The Instream Flow and Aquatic Systems Group of the Western Energy and Land Use Team, in cooperation with the Soil Conservation Service, has developed a model with complete documentation to predict instream water temperatures for historical or synthetic hydrological, meteorological, and physical stream geometry conditions. The model is applicable to any size watershed or river basin. It incorporates many features including: heat transport, heat flux, solar, shade, meteorology corrections, and regression aids. The model can and has been used satisfactorily to evaluate the impact on instream water temperatures for the following applications: various reservoir releases--both discharges and temperatures; riparian vegetation--existing, previous, and proposed; and stream withdrawals and returns. Various solution techniques are offered to enable the user to more easily obtain reasonable answers for each application. The software for all the solution techniques is available.

FOR ADDITIONAL INFORMATION: Contact: Dr. Fred Theurer or Dr. Clair B. Stalnaker, Western Energy and Land Use Team, 2627 Redwing Road, Creekside One, Fort Collins, CO 80526; (303) 226-9331.

0836 Landsat Data Is Being Used To Improve Hydrological Modeling

Department of the Army, Washington, DC.

Nov 83 (D)

For more than a decade researchers have been using satellite imagery for regional site analyses, and currently data from the Landsat-MSS (Multispectral Scanner Subsystem) are being analyzed in an effort to improve the capability of large-scale hydrologic models. Recently, researchers have been working on a study aimed at integrating Landsat land cover data into a hydrologic model developed. In order to make the landsat imagery compatible with a 40-acre grid cell size selected. The researchers had to transform the digital data through a number of complex procedures. This study demonstrates that Landsat digital data can be placed into a geographic information system at low cost.

FOR ADDITIONAL INFORMATION: Contact: Harlan McKim, Cold Regions Research and Engineering Laboratory, P.O. Box 282, Hanover, NH 03755; (603) 643-3200.

0837 Lightweight Hydraulic Roof Support

Department of the Interior, Washington, DC.

Apr 83 (D, F)

A 22-ton capacity temporary mine roof support light enough to be easily lifted and transported manually from one place to another was developed. The lightweight hydraulic aluminum support is designed for use in any temporary support situation in place of wood posts or steel mechanical or hydraulic supports. The supports feature a release valve for quick manual extension to roof level.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number PB83-115840, price code: A05.

0838 Lining a Vertical Mine Shaft With Concrete: The lining is poured and set while the shaft borer advances

Department of Energy, Washington, DC.

Jul 83 (D)

A new apparatus speeds and simplifies the placement of a concrete lining in a vertical mine shaft. The apparatus travels down the shaft, cooperating with the boring machinery in an integrated boring/lining process. Typically, the system places a lining of 22 ft. inside diameter in a shaft of about 24 ft., 4 in. diameter.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: FE-9125-1, price code: A06 or for licensing information, contact: Office of Assistant General Counsel for Patents, US DOE, Washington, DC 20585.

Low- to Moderate-Temperature Geothermal Reservoirs: A handbook aids the evaluation of resources

See 0352

0839 Machine-Mounted Exhaust Ventilation System for Cutting Machines in Salt Mines

Department of the Interior, Washington, DC.

Aug 83 (D)

Research was conducted on means of controlling dust generated during mining in salt mines. A machine-mounted exhaust ventilation system which moves with the cutting machine from place to place was developed. The system captures the dust at the face of the heading and exhausts it downstream of the heading in the crosscut. This helps cause fresh air from the crosscut to flow over the machine operator's position, and aids in keeping the dust cloud close to the face.

FOR ADDITIONAL INFORMATION: Contact: Steven J. Page, Pittsburgh Research Center, 18070, Pittsburgh, PA., 15236; (412) 675-6669. U.S. Bureau of Mines.

Math Model Developed to Determine Soil Erosion and Soil Productivity

See 0041

0840 Measuring Heat Flow in Geothermal Fields: Dual transducers yield data on vertical flux

Department of Energy, Washington, DC.

Oct 83 (C, K)

An instrument determines the vertical flow of heat from a geothermal reservoir. The instrument is therefore useful in

assessing the energy available in reservoirs and in evaluating the economic potential of drilling wells for geothermal energy. Two rodlike transducers are suspended by a cable in a borehole. Both transducers are held in position long enough to come to thermal equilibrium with the surrounding earth. One of the transducers has a much higher thermal conductivity than the other. The transducers are surrounded by water or drilling mud, which serves as a heat coupling medium.

FOR ADDITIONAL INFORMATION: The patent on which this technical note is based is U.S. Patent 4,313,342, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1. For licensing information, contact: Office of Assistant General Counsel for Patents, Washington, DC 20585.

Method Is Developed To Help Predict Soil Liquefaction

See 0137

Methods For Determining Gas Contents of Various Rock Types

See 0114

0841 Mitigation and Enhancement Techniques for the Upper Mississippi River System and Other Large River Systems

Department of the Interior, Washington, DC.

Oct 83 (C)

A new, 714-page handbook describes techniques to enhance environmental resources and mitigate impacts to fish and wildlife resources of freshwater systems. Impacts addressed include urban and industrial development, present and future operation and maintenance of a navigation channel and natural processes, especially sedimentation. Methods are compared in terms of cost, utility, ease of implementation and the probability of causing environmental damage. An impact assessment methodology, information on the effects of navigation, glossary. Summary and index are also included. The techniques and measures can be used by resource managers, land use planners, environmental specialists to reduce, eliminate or minimize the negative impacts of man's activities on aquatic systems.

FOR ADDITIONAL INFORMATION: Contact: Ms. Rosalie A. Schnick, National Fishery Research Lab, P.O. Box 818, La Crosse, Wisconsin 54601; (608)783-6451.

0842 Modifying Exhaust Outlet Reduces Vehicle Operator Exposure to Diesel Exhaust

Department of the Interior, Washington, DC.

May 83 (D)

In order to reduce the exposure of diesel vehicle operators to diesel exhaust generated during mucking in deadend drifts, diesel engine exhaust was directed upward and rearward thereby using the thermal buoyancy of the hot exhaust to form a layer at the roof, above the breathing zone of the vehicle operator. On most load machines, the diesel engine's exhaust outlet is located near the floor so that hot exhaust rises into the vehicle operator's breathing zone.

FOR ADDITIONAL INFORMATION: Contact: Dr. George H. Schnakenberg, Pittsburgh Research Center, P.O. Box 18070, Pittsburgh, PA 15236; (412) 675-6655.

0843 New Machine-Mounted Dust Collector System for Continuous Mining Machines

Department of the Interior, Washington, DC.

Oct 83 (D)

It was desired to capture airborne coal dust generated by a continuous mining machine to reduce workers' dust expo-

sure and to improve face visibility. A practical means of removing this dust is with a scrubber mounted directly on the mining machine. A low-profile, machine-mounted dust collector (MMDCC) was developed to avoid adding extra height to the continuous mining machine.

FOR ADDITIONAL INFORMATION: Contact: John A. Organiscak, Pittsburgh Research Center, P.O. Box 18070, Pittsburgh, PA 15236; (412) 675-6675.

0844 Predicting Biological and Physical Effects of Reduced Flow

Department of the Interior, Washington, DC.

Jul 83 (D, E)

With accelerating demand for water resources, there is increased need for biologists to be able to accurately predict how much water is needed to meet ecological requirements of aquatic organisms and how much biomass is lost at increments of reduced discharge. This problem was evaluated by conducting seasonal controlled flow tests in large artificial channels with run-riffle configurations. The response of aquatic insects and juvenile rainbow and steelhead trout were examined to flow related changes in habitat and assessed the predictive reliability of three hydraulic simulation models currently used in making instream flow recommendations. Several insect taxa were significantly and adversely affected by low flow conditions. Flow reduction in the tests resulted in decreased numbers and biomass of juvenile rainbow-steelhead trout.

FOR ADDITIONAL INFORMATION: Contact: Robert G. White, Montana Cooperative Fishery Research Unit, Department of Biology, Montana State University, Bozeman, Montana 59717.

Pure Nitrogen From Diesel Exhaust: Gas can be used for corrosion-free drilling

See 0419

0845 Refractive-Index Logging Device: System provides high-resolution measurements for evaluating gas- or oil-bearing strata

Department of Energy, Washington, DC.

Nov 83 (B, C, K)

A downhole antenna system permits accurate assessments of the refractive index of Earth formations from bore-holes. The accuracy is required to plan a cost-effective exploitation of tight reservoirs in which the oil or gas cannot be easily removed without enhanced recovery techniques. The system consists of a transmitting coil located downhole, a proximity coil positioned adjacent to the transmitting coil, and six receiving coils aligned along the same longitudinal axis approximately 30 cm apart from each other.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE83-002362, price code: A02. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

0846 Retrofit Noise Control Techniques for Crushing and Screening Plants

Department of the Interior, Washington, DC.

Nov 83 (D)

Lower noise exposure levels was desired for operators and cleanup personnel working in portable nonmetallic mineral crushing and screening plants. High noise levels were measured in eight typical plants, and analysis of the collect-

ed data helped to identify the major areas of noise generation. Then, retrofit noise control techniques were designed and tested to specifically address the areas of high noise level generation.

FOR ADDITIONAL INFORMATION: Contact: Thomas Bobick, Bureau of Mines, Pittsburgh Research Center, P.O. Box 18070, Pittsburgh, PA 15236; (412) 675-6673.

0847 Revegetating Coal Refuse: Even a shallow soil cover greatly aids the growth of vegetation

Department of Energy, Washington, DC.

Oct 83 (C, E)

Sixteen experimental plots were established on a coal-mine disposal site in southwestern Illinois to evaluate methods for restoration of areas covered with highly acidic coarse refuse from mining 'gob'. The plots were used to compare the effects of four soil-cover depths and two limestone application rates on vegetation establishment and growth. All plots were fertilized at the same rate and seeded with a mixture of seven grasses and one legume. Plant germination, density, cover, and production were measured as were such soil-abiotic factors as precipitation, moisture, pH, and physical and chemical characteristics.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-019250, price code: A05.

0848 RF Simplifies Recovery of Heavy Oils: RF heat thins the heavy oil, making the recovery more economical

Department of Energy, Washington, DC.

Jul 83 (D)

RF heating is an efficient and effective way of softening heavy oil deposits in tar sands and oil shale so that their bitumen content can be extracted more economically than by conventional means. RF energy (0.01- to 10-MHz frequency range) penetrates the heavy oil deposits far more deeply and heats them more uniformly than, for example, such heating methods as steam injection. The process produces 4 to 10 times more energy than it consumes.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DOE/CH/90035-4, price code: All or for information not provided contact Jack Bridges, IT Research Institute, 10 West 35th Street, Chicago, IL 60616; (312) 567-4488.

Sheathed Rock-Breaker Explosive Charge

See 0928

0849 Solar-Assisted Solution-Mining Concept: Brine heated in a solar pond would dissolve minerals from deposits

National Aeronautics and Space Administration, Washington, DC.

Aug 83 (C, D)

A proposed solution-mining process would use solar energy to help dissolve minerals from layered deposits beneath the surface of a dry lake bed. Meeting the energy requirements of solution mining with fossil fuels is uneconomical; hence, no such process for mining dry-lake evaporite minerals is now in use. The proposal envisions the mining of sodium carbonate (Na_2CO_3) from strata containing trona ($\text{Na}_2\text{CO}_3 \cdot \text{NaHCO}_3 \cdot 2\text{H}_2\text{O}$) located 35 m below the surface of Searles Lake, California. However, the same method could presumably be adapted for mining other minerals

found in such sites. In the proposed process solar energy is collected within a brine in a thermal-gradient solar pond.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15343.

0850 Sprayfan Aids In Effectively Controlling Methane

Department of the Interior, Washington, DC.

May 83 (D)

In order to reduce face methane concentrations, water sprays on continuous mining machine are used to move and direct air to the face. The sprayfan has proved an effective means of ventilations. Underground sprayfan tests have shown that methane peaks over 2% can be reduced by a factor of 15. The effectiveness of the spray fan can safely permit the curtain distance to be increased to a distance of 20 feet.

FOR ADDITIONAL INFORMATION: For Information on licensing, write to the Office of the Solicitor, U.S. Department of the Interior, 18th & C Streets, NW, Washington, D.C. 20241. For other information contact Jon C. Volkwein, Bureau of Mines, Pittsburgh, PA 15236; (412)675-6689.

0851 Transducer System Traces Mine-Face Curve: Automated system measures angles between track sections

National Aeronautics and Space Administration, Washington, DC.

Jan 83 (D)

An electromechanical system is capable of obtaining contour information on a longwall coal face while a longwall shearer mines coal. Two heavy-duty angle transducers 2.5 feet apart are attached to a common reference surface and operate in conjunction with a distance encoder to measure the angle between adjacent track sections along the coal face.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer, P.O. Box 8757, BWI Airport, MD 21240. Refer to MFS-25289.

0852 Uranium From the Sea: Extraction from seawater is feasible and may be economical

Department of Energy, Washington, DC.

May 83 (D)

A new concept for extracting U_3O_8 from seawater promises to be economical. Costs on the order of \$150/lb (\$330/kg) may be within reach; such costs are competitive with those of breeder reactors and other power systems. The key to successful recovery is a high flow of water through an extractor (about 4.8 million gal/min). A concept that will allow such a high flow is based on a catamaran-type vessel in which seawater is pumped through ion-exchange 'wool' in each of the vessel hulls. A fibrous ion-exchange medium was selected in preference to a fluidized bed because it offers far less resistance to flow (less than 1 psi)

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number:DE82-013662, price code: A07.

0853 Water-Jet-Assisted Rock-Cutting Bits: Benefits include less dust and a substantial reduction in cost

Department of Energy, Washington, DC.

Jan 83 (D)

In an effort to improve the cutting efficiency of excavation machines in coal mines, experiments were conducted on the effects of water-jet assistance for drag-bit cutting of sedimentary rocks. Estimates based on the experimental results show the potential for improvement in performance and reduction in cost. The high-pressure water jet reduced the cutting forces on drag bits in hard and soft sandstone, shale, and limestone, with dragforce reductions of up to 30 percent in the sandstones.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DOE/ET/12463-1, price code: A05 or for information not in the report, contact Richard Markley, US DOE, M.S. D-107, Washington, DC 20545; (301)353-2716.

NUCLEAR SCIENCE & TECHNOLOGY

Diagnostic Instrument for Fusion Reactors: Instrument successfully measures tokamak atomic-deuterium outflux at energies below 100 eV

See 0441

0854 Explosive Joining for Nuclear Reactor Repair: A ribbon charge yields a joint with double the parent metal strength

National Aeronautics and Space Administration, Washington, DC.

Oct 83 (G)

High radiation levels and crowded workspaces complicate the repair and replacement of fuel channel in nuclear reactors. Using an explosive joining technique demonstrated at Langley Research Center, however, the repairs are made remotely, resulting in a joint that is double the strength of the parent metal. In the initial assembly of the reactor, each fuel channel (a total of 390) is manually fusion-welded to a bellows assembly on the reactor face through a thin-walled low-carbon-steel adapter flange.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: LAR-12996/TN.

An Improved Ceramic/Metal-Alloy Seal: New method produces seals that withstand high temperatures and pressures

See 0711

0855 Improved Monitor for Alpha Emission in Air: Instrument is compact, accurate, and quiet

Department of Energy, Washington, DC.

Jul 83 (E, K)

A new alpha dosimeter offers major improvements in readout method, airflow system, and elapsed timer and is generally more sensitive, accurate, and reliable than previous instruments. The dosimeter is used to measure alpha emissions from radon and its daughter products, which present an inhalation hazard. The new instrument contains on its front panel, digital readouts of total integrated count and elapsed time. It uses a solid-state surface-barrier detector, large-scale IC's, and a highly-regulated constant-airflow system. The air pump is powered by a brushless motor, which can operate continuously for more than a year without maintenance. The unit is virtually silent, which makes it suitable as a home monitor in residential studies.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by order-

ing the NTIS report, order number: DOE/EML-389, price code: A02 or information not provided in the report contact Norman Latner, Environmental Measurements Laboratory, 376 Hudson Street, New York, NY 10014; (212) 620-3646.

0856 Mass Producing Targets for Nuclear Fusion: A metal-encapsulation technique would advance the prospects of controlling nuclear fusion

National Aeronautics and Space Administration, Washington, DC.

Jul 83 (D, J)

A process tested in the laboratory could mass-produce targets for controlled nuclear fusion. Spherical capsules - the targets - are formed from molten metal and simultaneously filled with heavy isotopes of hydrogen that would serve as the nuclear fuel. Rapid solidification of the molten metal takes place while the targets are in free fall, promoting a spherical form. In the process, molten metal - tin, gold, or lead, for example - is forced through an axisymmetric nozzle that contains a center tube providing a flow of fill gas, which could be the fuel. The resultant hollow liquid jet spontaneously pinches off uniform lengths of the gas jet, encapsulating the fill gas. These quickly separate under free fall and become spherical before they completely freeze.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240: 9301) 621-0100. Refer to : NPO-15455.

0857 Measuring Radon Levels Indoors: Techniques are suggested and study results are reported

Department of Energy, Washington, DC.

Dec 83 (E, K)

A report describes various types of monitoring and sampling techniques that can determine the radiation imposed on the general public from radon and its decay products. Such techniques are important because they allow an assessment of possibly-increased radon levels resulting from energy conservation and increasingly airtight buildings. The radon may come from building materials and underlying soil, rocks, and water. Among the techniques covered are those for measuring the range and distribution of radon and radon decay products through broad surveys using simple and convenient integrating/monitoring instruments.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE 82-021874, price code: A02. For information not in the report, contact Andreas C. George, U.S. Department of Energy, Environmental Measurements Laboratory, 376 Hudson Street, New York, N.Y. 10014; (212) 620-3653.

0858 Miniature Gamma-Radiation Sensor: Preliminary radiation and temperature tests are made

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (J, K)

Two solid-state gamma-radiation detectors/sensors are under development for the design and construction of a wristwatch-size radiac. The study is being conducted for the U.S. Army Electronics Research and Development Command. The radiation sensor will use two cadmium telluride detectors, one for low flux and the other for high flux, to cover an eight-decade exposure range of cesium-137 gamma radiation with 10 percent maximum variation in sensitivity over a temperature range of - 46 to 52C.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A108774, price code: A03.

0859 NMMW Radiation Detector: Hot-electron photoconductive detection of NMMW radiation was observed in mercury/cadmium telluride single crystals
Army Materiel Development and Readiness Command, Alexandria, VA.
May 83 (J, K)

A hot-electron photoconductive detector for the near-millimeter-wave (NMMW) radiation has been developed by the U.S. Army Electronics Research and Development Command, using single crystals of mercury/cadmium telluride. The operation of this semiconductor material in the hot-electron photoconductive mode can be expanded to IR and NMMW broadband video receivers for spectroscopic studies of materials and atmospheric gases, and submillimeter heterodyne receivers for fusion-plasma diagnostics.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A090449, price code: A02 or contact project officer Bruce A. Weber (202) 394-1551.

0860 The Oak Ridge National Laboratory Monazite Process for Stabilization of High-Level Radioactive Waste
Department of Energy, Washington, DC.
May 83 (H)

A new primary waste form for the safe disposal of high-level radioactive wastes has been developed. This nuclear waste storage medium is formed by producing a synthetic analog of the highly stable thorium and uranium bearing natural mineral monazite. The radioactive waste ions are thus chemically bound in a dense monolithic polycrystalline matrix of lanthanide orthophosphates. This 'monazite' type waste form is clearly superior to borosilicate glass in retaining Sr, Cs, and the transuranics under aqueous leaching conditions. The transuranics Cm, Am, Pu, Np, and U have also been successfully incorporated in this material. The product is applicable to the disposal of reprocessed nuclear power reactor wastes, high-level radioactive defense wastes, and high-level transuranic wastes. The material can also be used as a physically and chemically stable matrix in commercial, medical, and research applications of hazardous transuranic isotopes.

FOR ADDITIONAL INFORMATION: Contact: D.W. Jared, Oak Ridge National Lab, P.O. Box X, Oak Ridge, TN 37830; (615)574-4192. Refer to 459/X/TN.

Producing Curie Quantities of Sr-82, 85 Isotopes: A hot cell purifies Sr-82-82, 85 and other isotopes from proton-irradiated molybdenum
See 0118

0861 A Radiation Detection System: Special fluors emit light at wavelengths greater than 500 nm and with a decay time of less than 10 ns in response to radiation
Department of Energy, Washington, DC.
Jun 83 (J, K)

A method uses a radiation-to-light converter in combination with an optical fiber to detect radiation and transmit the light produced by the converter to a remote location for recording, display, or other processing. Liquid and plastic fluors, which emit in the 500- to 600-nm wavelength region,

have been developed for use as radiation-to-light converters. These include ternary liquid systems with decay times as short as 1.3 ns at 560 nm. Other liquid and plastic fluors are provided with improved emission characteristics, in the region of 600 nm. In the proposed radiation-detection system, a radiation-to-light converter emits light when subjected to radiation. The emitted light is received at one end of the wave-guide, transmitted through, and emitted at the other end. The light is then detected by a photodetector.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,292,527, which is available for \$1.00 from Washington, DC 20231. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

Radionuclide Counting Technique Measures Wind Velocity: The change in position of a radioactive source translates into wind-velocity measurement
See 0050

0862 Shipping Container for Radioactive Heat Source Module: Extensive tests have demonstrated that the container is safe for transporting plutonium
Department of Energy, Washington, DC.
Jul 83 (D)

A shipping container has been designed to transport three encapsulated, general-purpose heat source (GPHS) modules that contain decaying plutonium-238. The container, generating a total of 750 W of heat, must meet structural integrity, thermal-resistance, radiation-shielding, radiological-safety, nuclear-criticality-safety, and quality-control criteria. The GPHS-module shipping container consists of three stainless-steel cans placed inside a finned cask that is completely enclosed within a cage-type carrier. Calculations showed that the finned cask is capable of withstanding 770 times the energy available from the penetration test without yielding and 300,000 times the energy load specified in the compression test without exceeding the maximum allowable stress.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-012285, price code: A05 or information not provided in the report contact Mike Whitney, P.O. Box 32, Monsanto Research Corporation, Miamisburg, OH 45342; (513) 865-3835.

Temperature, Density, and Level Measurement System
See 0498

0863 A Ternary Liquid Scintillator: Liquid scintillator makes an effective radiation-to-light converter
Department of Energy, Washington, DC.
May 83 (J, K)

A liquid-scintillator system based on 5-amino-9-diethylaminobenz (a) phenoxazonium nitrate (commonly known as Nile Blue Nitrate) converts radiation to light for a fiber-optic remote-monitoring system. The system has temporal characteristics comparable to conventional 'blue scintillators' while emitting in the long-wavelength (700-nm) region and has relatively high efficiency. Its development is an important step in creating practicable radiation-to-light converters. Such converters will permit remote radiation monitoring via fiber-optic transmission - a more accurate and efficient approach than the transducer/cable-transmission radiation-monitoring systems.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number:DE82-011744, price code: A02, or for licensing information, contact Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

Welding High-Temperature Components of Nuclear Plants: While a data base is being accumulated, the use of conservative interim design methods is recommended
See 0767

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0864 Reducing the Weight and Volume of Fruit Cuts Expenses

Department of Agriculture, Washington, DC.
Oct 83 (D, J)

Reducing the weight and volume of fruit destined for use in candies, ice creams, pies and baked goods also reduces costs for packaging, refrigerating, freezing, shipping and storing the fruit. Scientists have used a technique called osmotic concentration to cut in half the weight and consequently the volume of apples, peaches and apricots without seriously hurting the fruit's flavor, color, texture, or other major characteristics important for food items containing them. Osmotic concentration is one of the most efficient ways to remove moisture from fruit because water doesn't have to go through a phase change, water to steam, as it leaves the product.

FOR ADDITIONAL INFORMATION: Contact: Dr. Charles C. Huxsoll, USDA-ARS, Western Regional Research Center, 800 Buchanan St., Berkeley, CA 94710 (415) 486-3484.

OCEAN TECHNOLOGY & ENGINEERING

0865 Bathymetric Swath Survey System: Higher accuracy, faster data rates, broader angular coverage

Department of Commerce, Washington, DC.
Jul 83 (B, D)

The System (BS3) was developed by NOAA to increase the accuracy and efficiency of bathymetric surveys. The system is a multi-beam sonar system design to gather hydro-graphic data in water depths from ten meters to 600 meters. The multi-beam concept makes it possible to have complete coverage of bottom bathymetric in swaths of width roughly 2.5 times and water depth. The BS3 provides higher accuracy, faster data rates, and broader angular coverage required in intermediate water depths than existing systems. During a survey, a plot is generated showing the vertical depth and bathymetric contours for the shoaler side of the swath. In addition a position plot is produced showing the vessel track and the extent of swath coverage.

FOR ADDITIONAL INFORMATION: Contact: Donald Pryor, NOAA/N/C/CGx3, 6001 Executive Blvd., Rockville, MD. 20852; (301) 443-8635.

0866 Center Tests Distortion of Aluminum Ship Model

Department of the Navy, Washington, DC.
Nov 83 (D, K)

A one-third-scale model of an aluminum ship has recently been fatigue-tested at the David Taylor Naval Ship R&D Center. The aluminum ship evaluation model (ASEM), which contained all the frames, bulkheads, stiffeners,

decks, openings, and hatchways of an actual ship, was constructed according to conventional shipyard welding and fabrication procedures for aluminum. Shadow Moire techniques were used to obtain a contour map of the plate distortions on external decks and on internal transverse bulkheads. The absolute magnitudes of the maximum plating distortions were compiled since the direction of deformation is believed to have a negligible effect on plate or grillage strength.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer, Code E411, March 83 No. 2, Naval Surface Weapons Center, Dahlgren, VA 22448.

Concrete Excels for Deep-Ocean Construction

See 0131

0867 Development of Hormones to Stimulate Spawning in Exotic Fish Species

Department of the Interior, Washington, DC.
Jul 83 (E)

Because the spawning of exotic fish could not be accomplished in large numbers in the U.S. these fish had to be imported. Development of methods to allow spawning of these exotic fish in Florida will decrease the Nation's dependence on foreign imports. The methods developed should allow the artificial spawning of most species presently used by the industry. The methods can be used at any time of the year rather than having the natural spawning occurring only during relatively short periods of time naturally.

FOR ADDITIONAL INFORMATION: Contact: James A. McCann, National Fishery Research Laboratory-Gainesville, U.S. Fish and Wildlife Service, 7920 N.W. 71st St., Gainesville, Florida 32606.

0868 Drop-Weight Tests Apply Sudden Loads on Ship Equipment Mounts

Department of Navy, Washington, DC.
Jan 83 (K)

The effects of dynamic buckling on the foundations of ship internal equipment in the event of an underwater explosion have been studied by the David Taylor Naval Ship Research and Development Center. Dynamic buckling is a collapse mechanism triggered by compression loads in the foundations of equipment mounted in a ship. A series of drop-weight tests was devised for the experimental study.

FOR ADDITIONAL INFORMATION: Contact: Navy Technology Transfer, Code E411, Naval Surface Weapons Center, Dahlgren, VA 22448. Refer to 070802.

0869 HF Doppler Radar Observations of Coastal Ocean Surface Current and Wave Fields

National Oceanic and Atmospheric Administration, Washington, DC.
Feb 83 (B, K)

Software and hardware have been developed for an HF Doppler radar system called CODAR (Coastal Ocean Dynamics Application Radar). It is capable of observing surface currents, upwellings, wave height, wave direction over approximately 2,000 sq. kilometers of coastal ocean in near-real-time. Computer managed data acquisition prepares current maps, suitable to track floating pollutants, or detect upwellings of interest to commercial fisherman. Possible applications include ocean dynamics research, air-sea rescue, coastal recreational boating, monitoring floating pollutants, tsunami warnings, and fishery management.

FOR ADDITIONAL INFORMATION: Contact: Dr. Shelby Frisch, Wave Propagation Laboratory, NOAA/ERL/R45, 325 Broadway, Boulder, CO 80303; (303)497-6209.

Laminated Composites Meet Cathodic Demands for Seawater Use
See 0716

Molluscan Aquaculture: Improved Techniques for Hatchery Production
See 0043

0870 New Idea Moves 20-Ton Containers from Sea to Shore

Department of the Navy, Washington, DC.

Oct 83 (D)

A Transway Monorail Container Handling System has been developed by the Naval Civil Engineering Laboratory, Port Hueneme, CA. The system is suspended from prestressed concrete towers. The platform pier abuts the containership for transfer of containers to a monorail. Engineers envision the following operation within 10 years: A caravan of containers, transferred from a containership, will glide to shore down the sloped monorail. The length of the monorail, from 2,500 to 10,000 feet, will depend on how closely to shore the ship can be moored safely.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer, Code E411, March 83 No. 3, Naval Surface Weapons Center, Dahlgren, VA 22448.

0871 Predicting and Preventing Sediment Scour at Seafloor Facilities

Department of the Navy, Washington, DC.

Jun 83 (D)

The primary defense against foundation failure from sediment erosion at ocean facilities is to realize that scour can be severe and plan accordingly. One way of guarding against structural instability when designing piling is to estimate and allow for overburden removal by scouring. When this is not possible, an inverted soil filter may be used to prevent sediment erosion. Criteria for correctly sizing the inverted filter and protective rock to prevent sediment migration up through the filter are straightforward. In situations where short term protection is required or where soil filter material availability is low, geotextiles (filter fabrics) may be used.

FOR ADDITIONAL INFORMATION: Contact: Mike Atturio, Code L42, Naval Civil Engineering Lab., Port Hueneme, CA 93043; (805) 982-5780.

0872 STATMOOR: Computer Static Analysis of a Single-Point Moored Vessel

Department of the Navy, Washington, DC.

May 83 (A, D)

The program calculates the static response of a single-point moored vessel and hawser. Steady wind, wave, and current loads are considered. STATMOOR was written to demonstrate that interactive micro-computer programs can perform complicated analyses without requiring extensive knowledge or training from the user. The program can determine the current direction which produces the maximum hawser load. Output can be obtained in graphic or tabular form. The original version of STATMOOR was written in BASIC for a DEC micro-computer. Simplified versions are available for Tektronics and APPLE micro-computers.

FOR ADDITIONAL INFORMATION: Contact: Mr. Jim Cox, Naval Civil Engineering Lab., Point Hueneme, CA; (805) 982-5742.

0873 A Survey Spar System For Precision Offshore Seafloor Surveys

Civil Engineering Lab. (Navy), Port Hueneme, CA.

Feb 83 (D)

Moorings, piers, pipelines, oceanographic instrumentation, and other diver-depth facilities often must be precisely located on the seafloor. A precision positioning technique has been developed and used. The system has proved to be a workable, easy, and accurate method for obtaining precise survey points on the seafloor. Its accuracy is considerably better than any previously used system. The hardware is simple and the concept appears to have application to a variety of offshore survey situations.

FOR ADDITIONAL INFORMATION: Contact: J. V. Wilson, Code L43, Naval Civil Engineering Laboratory, Port Hueneme, CA 93043. (805) 982-4623. Refer to 82-16/TN.

Underwater Acoustic Telemetry System: System has a large enough operating angle to transmit data between a submerged package and an anchored buoy

See 0183

Underwater Epoxy Dispenser Improves Grouting Technique

See 0648

0874 Underwater Structure Cleaning

Department of the Navy, Washington, DC.

Aug 83 (D)

Presently over half of the Navy's dive time required for underwater maintenance and repair is spent cleaning a structure before the actual work is begun. There is need for improved methods of underwater surface cleaning to decrease this surface preparation time. The development and recent widespread use of high pressure water jets has provided a means of quickly and effectively cleaning offshore structures. With the use of water jet devices, divers have obtained higher cleaning rates, decreased work time and improved ability to clean complex nodes and shapes that are inaccessible with conventional cleaning tools. As more diver safety features have been incorporated into high pressure water jet systems, this method of underwater surface cleaning has increased in use. An evaluation of current methods of underwater surface cleaning on waterfront structures has been conducted. A prototype underwater cleaning system that incorporates the best features identified during the tests has been developed for routine cleaning of structures, particularly in limited access areas.

FOR ADDITIONAL INFORMATION: Contact: C.A. Keeney, Code L43, Naval Civil Engineering Lab, Port Hueneme, CA; (805) 982-5487.

Uranium From the Sea: Extraction from seawater is feasible and may be economical

See 0852

PHOTOGRAPHY & RECORDING DEVICES

Advanced Testing of Electro-optic Components: Recent and proposed developments in testing optics are described

See 0426

PHYSICS

0875 Charge-Coupled Device for Recording Transients: Sub-microsecond transients are recorded and read out at slower rates

Department of Energy, Washington, DC.

Jan 83 (B)

A linear charge-coupled device (LCCD) records rapid transient electrical signals, then reads them out at slower rates. The compact device is housed in a 40-pin flat pack designed for high-bandwidth applications.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: UCID-19048, price code: A03 or contact Joseph W. Balch, Lawrence Livermore National Laboratory, P.O. Box 808, Livermore, CA 94550; (415) 422-8643.

0876 Compact, Rugged Temperature Recorder: Unattended solid-state unit stores 2,048 readings taken at intervals of 1.875 to 240 minutes

National Aeronautics and Space Administration, Washington, DC.

Jun 83 (B, K)

A small, light, self-contained temperature recorder that was originally developed for use in space experiments can store 2,048 temperature readings taken over a period of almost a year (or much less) and then read them out when a special readout unit is plugged into it. The temperatures may be anywhere in the range from -10 to +50 C and are recorded at intervals selectable by factors of 2 from 1.875 up to 240 minutes. The data can be retained in the recorder for at least 4 months before readout, if desired. The battery-operated recorder has no moving parts—it is completely solid-state electronic. The basic recorder can be simplified to accommodate a variety of applications by such changes as the addition of extra memory to store more data, by changing the front end to permit measurements other than temperature to be made, or by using different batteries to obtain different operating periods.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: NASA-TM-81267, price code: A04.

Fabricating Holographic Optical Elements: Procedures yield efficiencies greater than 90 percent

See 0888

0877 Transport Control for High-Density Digital Recorder: New servo feedback technique controls tape transport by monitoring deskew buffers

National Aeronautics and Space Administration, Washington, DC.

Nov 83 (B)

At data densities above 33 kbit/in. conventional servocontrol techniques proved to be inadequate for controlling tape movement in a ground-support recorder for a NASA satellite. A new system has the necessary resolution and is less sensitive to dropouts than are other tape feedback systems. It is also stable at low speeds. In the new system the servo feedback signal is derived from the data track signals, so that no separate servo track is required. The system can be adapted to any recorder that uses deskew buffers. It requires no overhead information beyond the synchronizing words already required for data deskewing.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Division, P.O. Box 8757, BWE Airport, MD. 21240; (301) 621-0100 Ext. 241. Inquiries concerning nonexclusive

or exclusive license for its commercial development should be addressed to John O. Tresansky, Goddard Space Flight Center, Mail Code: 204, Greenbelt, MD. 20771; (301) 344-7351. In either case refer to GSC-12724/TN.

0878 X-Ray Holography: Microscopic structures could be imaged with high spatial and temporal resolution

Department of Energy, Washington, DC.

Apr 83 (E, J, K)

Tentative conclusions have emerged from a preliminary survey of problems in the development of X-ray holography. The eventual objective of this holographic technique is to use short-pulse, high-intensity X-ray lasers to image microscopic structures. Of the several alternatives, the most promising now seems to be a Fraunhofer transform imaging system -- a special case of Fresnel transform holography -- with a polymethyl methacrylate (PMMA) photoresist as the recording medium. The PMMA is chosen because it approximates the high resolution (100A) required by the 30-to-50-A wavelengths that are contemplated. A hologram registered on the photoresist can be read out by a transmission electron microscope.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE82-010416, price code: A02.

PHYSICS

0879 Accelerator for Studying Electron Beams in Large Diodes: Cherenkov radiation is a powerful tool for mapping the time evolution of current distribution outside a diode

Department of Energy, Washington, DC.

May 83 (J)

Initial tests in electron-beam control and the uniform excitation of large-volume lasers were conducted by the Sandia National Laboratories on an accelerator (RAYITO) designed for studies associated with the generation of high-current large-area electron beams and their transport and deposition in a gas medium. The two areas of major interest were (1) the efficiency and uniformity of beam generation and (2) energy-deposition uniformity. The spatial distribution of current was monitored by the time-resolved photography of Cherenkov radiation emitted by a dielectric converter plate placed perpendicularly to the direction of beam propagation.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number SAND-81-0844C, price code: A02.

Advanced Testing of Electro-optic Components: Recent and proposed developments in testing optics are described

See 0426

Aligning Massive Equipment Accurately: Computerized laser system allows simple and precise measurements of displacement

See 0507

0880 Ampoule With Integral Feedthroughs: A vacuum-tight ampoule is used for crystal growth by the Bridgman method

National Aeronautics and Space Administration,
Washington, DC.

Jul 83 (J)

The key feature of a new crystal-growth ampoule is a molybdenum-to-quartz vacuum feedthrough that can be assembled in the laboratory. One feedthrough is attached to each end of the cylindrical ampoule, used for crystal growth by the Bridgman method, allowing interface demarcation by passing periodic current pulses through the sample during growth. The new ampoule is also vacuum-tight, so that it protects exposed areas of the furnace from corrosive vapors emanating from the sample and at the same time prevents changes in composition of the melt due to preferential vaporization of one of its components..

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: LAR-12889.

Automatic Measurement of Crystal Angles: Prototype system promises to reduce the cost of producing crystal resonators

See 0429

0881 Characterizing Optical-Fiber Waveguides:

Textbook discusses methods to evaluate the design and performance

Department of Commerce, Washington, DC.

Aug 83 (B)

A recently published textbook discusses various means to characterize backscatter, bandwidth (in time domain), and index profile (refracted near field) of optical-fiber waveguides. The textbook is the first volume of a series the National Bureau of Standards is publishing to document certain practices that are being considered as industry standards.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: PB83-111609, price code: A10.

0882 Chemical Vapor Deposition of Germanium on Silicon: Interface stresses are reduced during both growth and cooling periods

National Aeronautics and Space Administration,
Washington, DC.

Nov 83 (H, J)

Experimental work has shown that chemical vapor deposition (CVD) by pyrolysis of gaseous germanium tetrahydride provides epitaxial layers of germanium on silicon. The relatively low temperature of the CVD process (500 to 900C) reduces stresses that occur at the layer/substrate interface during growth and cooling. These stresses are created by the mismatch, between the mechanical, thermal, and crystallographic properties of germanium and silicon. The process is under development; when refined, it could be used for fabricating germanium-on-silicon photovoltaic surfaces of the preferred orientation toward Ge (111).

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-15565/TN.

Chemical Vapor Deposition of Niobium Germanide: Improved deposition produces strong bond between this superconductor and metal substrate

See 0095

0883 Consistent Tolerance Bounds for Statistical Distributions: False hypotheses are screened by using consistent tolerance bounds

National Aeronautics and Space Administration,
Washington, DC.

Jul 83 (D, J)

The assumption that sample comes from a population with a particular distribution can be made with confidence C if the data all lie between certain bounds. These confidence bounds depend on C and on an assumption about the distribution of sampling errors around the regression line. The analysis of Space Shuttle surface-tile strength has led to the conclusion that when the distribution of errors is assumed to be the same as the population distribution, the resulting confidence bounds lie closer to the regression line than when other common confidence bounds are used.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: MSC-20090.

0884 A Continuous-Wave 194-nm Laser is Produced

Department of Commerce, Washington, DC.

Nov 83 (J)

A 194-nm continuous-wave laser with a line width of less than 2 MHz has been produced. It is believed to be the first cw laser at the 194-nm wavelength. A cw laser at this wavelength is required for radiation pressure cooling and optical pumping of electromagnetically confined mercury ions, which have great potential in new-generation optical and microwave frequency standards. The 194-nm radiation is produced by sum-frequency mixing the 2nd harmonic radiation of an argon-ion laser with that of a tunable dye laser. FOR ADDITIONAL INFORMATION: Contact: J. C. Berquist, Time and Frequency Division, National Bureau of Standards, 325 Broadway, Boulder, Colorado 80303; (303) 497-5459.

0885 Cube-Corner Retroreflector Modeling: Programs compute impulse-response and interference effects of reflected pulses from optical cube corners

National Aeronautics and Space Administration,
Washington, DC.

Apr 83 (A, J)

A collection of computer programs analyzes arrays of optical cube corners used in laser ranging. The programs perform the computations required to construct the shape of a laser pulse (impulse response) after it has been retro-reflected from a cube-corner array. The programs also calculate the interference-effects histogram and the far-field diffraction patterns. The programs are written in FORTRAN IV for batch execution and have been implemented on an IBM 360-series computer.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602, GSA-12718/TN.

0886 Curved-Surface Beam Splitter: Spherical entrance and exit surfaces minimize optical aberrations

National Aeronautics and Space Administration,
Washington, DC.

Oct 83 (J)

A beam splitter with curved entrance and exit surfaces introduces less chromatic aberration and Seidel aberrations in some optical systems than traditional plate or block beam splitters. The new design is used in pupil-concentric systems, such as the Schmidt-type mirror objective shown in the figure. Many optical applications require one objective to form images at several focal planes. Examples include color-TV cameras with three vidicon tubes and cameras used to separate a color printing presses. The proposed beam splitter - like the block beam splitter - has an optically flat, partially-reflecting interior surface. Unlike the conventional design, however, the beam entrance and exit surfaces are spherical and concentric about the aperture stop. Thus the beam splitter surfaces generate only spherical and chromatic aberrations. While these aberrations may be larger than without the beam splitter, no new types of aberrations are introduced.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Division, P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100 Ext. 241. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to the Patent Counsel, Goddard Space Flight Center, Mail Code: 204, Greenbelt, MD 20771; (301) 344-7351. Refer to GSC-12683/TN.

Diagnostic Instrument for Fusion Reactors: Instrument successfully measures tokamak atomic-deuterium outflux at energies below 100 eV

See 0441

0887 Experimental Closed-Cycle Laser-Gas Circulator: A laboratory unit is used to obtain design criteria

Army Materiel Development and Readiness Command,
Alexandria, VA.

Jul 83 (F, J)

A report of the U.S. Army Missile Command describes continuing work on a laboratory-scale closed-cycle gas circulator for pulsed, electrical-discharge lasers. The unit will be used to obtain design criteria for future systems. Although final performance data and design are not yet available, the description of the system and its components offers guidance to laser engineers, plasma researchers, and others concerned with the recirculation of gases in high-energy electrical discharges. The equipment pumps a mixture of 1/2He:1/3N₂:1/6CO₂ (numbers are mole fractions) at nearly atmospheric pressure through a discharge cavity.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A087219, price code: A06 or contact project officer Myron W. Cole (205) 876-2065.

0888 Fabricating Holographic Optical Elements: Procedures yield efficiencies greater than 90 percent

Army Materiel Development and Readiness Command,
Alexandria, VA.

Dec 83 (J)

A report describes fabrication of such holographic optical elements as lenses, gratings, and matched filters. The elements are used in imaging systems and optical data processing systems. The fabrication procedures, which were developed by the U.S. Army Missile Command, yield the ele-

ments with diffraction efficiencies of more than 90 percent. The elements are fabricated on dichromatin gelatin emulsion. Phase gratings are fabricated by recording the interference pattern between two plane waves from an argon ion laser. The angle between the two waves is such that the interference pattern has an average spatial frequency of approximately 1,000 lines/mm.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A11628, price code: A02 or contact project officer J.C. Duthie (205) 876-1607.

Fabry-Perot Photoelectric Spectrometer: A new design provides high luminosity and resolution

See 0447

0889 Growing Single-Crystal Nd:YAG: Formation of scattering centers is the major obstacle

Army Materiel Development and Readiness Command,
Alexandria, VA.

Dec 83 (J)

A report presents results of a study of the factors affecting the growth of single crystals of neodymium-doped Nd:YAG. Although it would be realistic to expect that many factors would contribute to problems in growing single crystals of a complex ternary system like Nd:YAG, the study finds that a single factor is the major influence; i.e., the tendency of the Nd:YAG melt to form scattering centers that create a polycrystalline solid instead of a single-crystal one. As part of the study, which was conducted by the U.S. Army Materials and Mechanics Research Center, dooped and undoped YAG crystals were grown without seeding.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A117401, price code:A02 or contact project officer Dennis J. Viechnicki (617) 923-3463.

0890 Heat Flow in Horizontal Ribbon Growth: A theoretical analysis focuses on conditions required for stable growth

National Aeronautics and Space Administration,
Washington, DC.

Oct 83 (J)

A recent theoretical study reveals some important effects of heat flow in horizontal ribbon growth. Particular attention is paid to the heat flow due to a laminar convection current in the melt induced by the horizontal motion of a ribbon-shaped semiconductor crystal being pulled from the melt. A series of different-modes of ribbon cooling was analyzed to determine the relationships between ribbon thickness, pull rate, melt temperature, and cooling of the ribbon. For each mode the conditions for which ribbon pull would be stable have been investigated. The analysis was done for silicon, but it could be redone for other semiconductors by substituting their physical properties for those of silicon.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: NPO-14979/TN.

Holographic Microscopy System: System achieves 2 micro m resolution throughout a 100-cm³ sample volume

See 0453

0891 InGaAsP CW Lasers on (110) InP Substrates:

Threshold current densities are below 1,000 A/cm² at room temperature

National Aeronautics and Space Administration,
Washington, DC.

Nov 83 (J)

Quality InGaAsP/InP CW laser structures have been grown by conventional liquid-phase epitaxy on (110) InP substrates without using special growth procedures. The low broad-area current densities and 1.3 micro m CW operation at room temperature indicate that InP/InGaAsP/InP laser structures with characteristics comparable to present state-of-the-art structures can be grown on the (110) InP substrates. Stripe devices exhibited continuous-wave thresholds as low as 150 mA at room temperature.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: LAR-12840/TN.

0892 Lasers for Loan

Department of Health and Human Services, Washington, DC.

Nov 83 (E, NTNJ)

The San Francisco Laser Center is lending laser for application in physical, biological, or clinical research. Qualified researchers from universities, industry, government laboratories, and other organizations conducting research that can be published in the open literature are eligible to use the lasers. Investigations that may lead to new research trends and new applications are given priority. At present 16 state-of-the-art commercial lasers are available from the facility. The continuous-wave lasers provided by the facility include helium-cadmium lasers, argon ion lasers, krypton ion lasers, and dye lasers. Pulsed lasers available from the facility include Nd:YAG lasers and Excimer lasers.

FOR ADDITIONAL INFORMATION: Contact: Dr. Andrew H. Kung, San Francisco Laser Center, University of California, Department of Chemistry, Berkeley, California 94720; (415) 642-8506.

Measuring Individual Phase Velocities in Flows: Statistical correlation is used to distinguish components

See 0463

Measuring Steam and Water Flow With Gamma Rays: Movement through a medium, such as sand, can be studied

See 0466

0893 NASTRAN(R): April 1982 Release

National Aeronautics and Space Administration,
Washington, DC.

Jan 83 (A, D)

The intended range of applications of NASTRAN includes almost every kind of structure and construction. Structural modeling elements are provided for the specific representation of the more-common structural building blocks, including rods, beams, shear panels, plates, and shells of revolution. Users may develop their own analysis capabilities by using the Direct Matrix Abstraction Programming (DMAP) language to direct NASTRAN in the solution of general matrix problems. The NASTRAN computer program is currently available for implementation on the following computer configurations: IBM 360/370 and IBM 303X series CDC 6000 and CDC CYBER 70/170 series, UNIVAC 1100 series, and DEC VAX series.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to HQN-10952.

0894 Nd:YAG Growth by the Heat-Exchanger Method: Improvements over the Czochralski method are noted

Army Materiel Development and Readiness Command,
Alexandria, VA.

Oct 83 (H, J)

Pure and Nd-doped Y₃Al₅O₁₂ (YAG) single crystals have been grown by the heat-exchanger method in experiments at the U.S. Army Materials and Mechanics Research Center. With 7.62-cm diameters and 10.5-cm lengths, they are believed to be the largest YAG crystals ever made. Because of the more efficient utilization of materials in the heat-exchanger method, laser rods should eventually be less expensive than rods cut from Czochralski-grown crystals.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A086314, price code: A02 or contact project officer Dennis J. Viechnicki (617) 923-3463.

0895 New Infrared Crystal Laser Developed

Department of the Navy, Washington, DC.

Dec 83 (B, J)

Research in the fields of color centers in alkali halide crystals (solid-state physics) and color center lasers at the Naval Research Laboratory (NRL) has resulted in the first demonstration of laser action in new color centers with a continuously tunable output of energy over an unprecedented breadth, from 2 to 4 microns. Also NRL developed a new method for stabilizing color centers which has resulted in the transformation of the color center laser from a research tool to a device with wide-ranging applications.

FOR ADDITIONAL INFORMATION: Contact: Navy Technology Transfer Fact Sheet, Code E411, Naval Surface Weapons Center, Dahlgren, VA 22448. Refer to 080703.

Producing Ruggedized Fiber-Optic Cable: Fabrication progress and test results are reported

See 0175

Production Testing of Electro-optical Components: Fully-automated test facility allows customized measurements

See 0487

Protective Coatings for Optical Fibers: A combination of fluoropolymer films strengthens fibers and seals them against moisture

See 0742

0896 Pulsed Thermal Diffusivity Measurements in Thin Films: A modified, fast pulse-heating technique is used for studying materials in which thermally induced decompositions occur

Department of Energy, Washington, DC.

Aug 83 (H, K)

The pulse-heating technique for thermal-diffusivity measurements has been modified for use with thin vapor-deposited coatings. This method uses a capacitive storage-pulsed power system to heat resistively thin substrates to temperatures within the 1,000 to 3,000 K range. The rapid heating (20 micro sec time interval) allows not only the study of the thin coatings; it also allows data to be collected on materials, which experience gradual restructuring or mass loss at high temperatures..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: DE81-023747, price code: A02. For information not provided in the report, contact David A. Benson, Sandia National Laboratories, P.O. 5800, Division 5534, Albuquerque, NM 87185, (505) 844-1187.

0897 RF Feedback Improves Free-Electron Laser: Laser efficiencies are anticipated to exceed 20 percent

Department of Energy, Washington, DC.

Feb 83 (J)

An RF feedback loop proposed for infrared and visible free-electron lasers is expected to increase the laser efficiency to an unprecedented 20 percent or more. The loop returns energy extracted from an accelerated beam back to the electron-beam accelerator. As a result, the power requirement for the klystron, which supplies RF energy to accelerate the beam, is reduced, enhancing the operating efficiency. Free-electron lasers have a number of useful industrial applications, among which are the cleaning of combustion-exhaust products by selective decomposition of noxious substances, purifying feedstocks in chemical processes, and the removal of impurities in coal gasification.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,287,488, which is available from: Commissioner of Patents, Washington, DC 20231. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

0898 Scheme for Improving the XeBr Laser: Working time and output of XeBr lasers are substantially increased by maintaining hydrogen-bromide levels and reducing molecular-bromine levels

Department of Energy, Washington, DC.

Jul 83 (J)

The high-energy output of XeBr laser can be significantly enhanced by inducing the recombination of H₂ and Br₂ to form HBr and by preventing the buildup of Br₂. Previously, the operation of XeBr lasers has been severely limited by the photodissociation of HBr, which is the halogen donor to the lasing material, and by the gradual buildup of bromine gas, which corrodes metal components and lowers the energy output of the laser. The scheme involves a closed loop in which the working medium is circulated by a metal bellows pump.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,317,087, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1.00. For licensing information contact: Office of Assistant General Counsel for Patents, US DOE, Washington, DC 20585.

0899 Simultaneous Electric and Magnetic Field Measurements Theory Has Been Developed

Department of Commerce, Washington, DC.

Aug 83 (B)

A single sensor to perform simultaneous near-field electric and magnetic field measurements has been a long-sought goal of electrical engineers. Researchers have proven the theoretical feasibility of such a sensor. The concept involves a loop antenna terminated with identical loads at diametrically opposite points. The theory indicates that by taking the sum and difference of the loop currents at each load, the electric-field and magnetic-field responses can be separated. In preliminary experiments using plane waves, a

3 db 180 degree hybrid junction was used to obtain the sum and difference currents in the loop. It is also possible to adjust electric and magnetic field responses of the loop by changing load impedances in order to obtain equal electric and magnetic loop responses..

FOR ADDITIONAL INFORMATION: Contact M. Kanda Division 723.03, National Bureau of Standards, Boulder, CO 80303.

0900 Structural Analysis of Shells: Program includes stress, buckling, vibration, and transient analysis of multisegment shells

National Aeronautics and Space Administration, Washington, DC.

Jan 83 (A, D)

The structural Analysis of General Shells computer program STAGSC-1 analyzes thin shell structures that have separate shell branches or segments connected to one another along their boundaries. It models structural problems with a minimum of input preparation. Triangular and quadrilateral shell elements are available. The definition of the structural configuration may include data from user-written subroutines, increasing the generality of the program and making the input more compact. In contrast to many structural codes, STAGSC-1 solves the nonlinear algebraic equation rigorously.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to HQN-10960.

0901 Structural Optimization: An interface between SPAR structural analysis and CONMIN optimization

National Aeronautics and Space Administration, Washington, DC.

Sep 83 (A)

The Programming Structural Synthesis System (PROSSS) provides structural synthesis capability by combining the SPAR and CONMIN computer programs with a set of interface procedures. SPAR is a large general-purpose finite-element structural-analysis program, and CONMIN is a large general-purpose optimization program. The user supplies two small problem-dependent programs to define the design variables, constraints, and the objective function. Unlike many other structural-optimization programs, the design variables, constraints, and the objective function can be represented in PROSSS by any choice of quantities, or combination of quantities, that form input and output of structural analysis. This allows the user to solve practical optimization problems formulated in many different ways. PROSSS is written in FORTRAN IV for batch execution and has been implemented on a CDC 6000-series computer and a PRIME 750 computer.

FOR ADDITIONAL INFORMATION: Contact: computer Software Management and Information Center Suite 112, Barrow Hall Athens, GA 30602 Refer to LAR-13010.

0902 Sunlight-Pumped Laser: Organic iodide gas is stimulated by a portion of the Sun's spectrum to emit laser light

National Aeronautics and Space Administration, Washington, DC.

Apr 83 (J)

A gas laser that is pumped by simulated Sunlight was tested in laboratory experiments with a solar simulator. Using a perfluoropropyl iodide gas (C₃F₇I) as the lasing medium, the device produced a continuous output of 4

watts at 1.315 mm. Peak power output up to 10 watts and lasing time in excess of 60 milliseconds were obtained for a single static fill.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div., P.O. Box 8757, BWI Airport, MD 21240. Refer to LAR-12870/TN.

0903 Superconducting Wires With Improved Strain Characteristics: Current capacity is less affected by applied tensile stress

Department of Energy, Washington, DC.

Mar 83 (B, H)

A simple improvement in superconducting wires makes them less susceptible to the adverse effect of the tensile bending and pulling stresses that normally occur during the winding of electromagnets. A slight alloying addition increases a compensating compressive stress that is built into the superconducting region during fabrication. With no other change in processing, the addition of about 0.18 weight percent of beryllium to the matrix increases the strength of the matrix at high temperatures. Consequently, when the matrix contracts about the filament during cooling, matrix suffers less plastic deformation and applies more compressive strain to the filament.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,324,842, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. DOE, Washington, DC 20585.

0904 Theory of Compound Liquid Drops: Dynamic behavior is analyzed for a drop within a drop within an infinite fluid

Department of the Army, Washington, DC.

Apr 83 (J)

A report delves into the theory of the dynamics of compound liquid drops. Compound drops consist of three fluids: an infinitely-extending host fluid surrounding a second fluid in the form of a shell, which in turn surrounds a third, core fluid. The report gives a theoretical basis for understanding the behavior of compound drops. It can aid in planning and interpreting experiments in the laboratory, in spacecraft, and in research aircraft. It also can provide insight into the fabrication of target pellets for nuclear fusion.

FOR ADDITIONAL INFORMATION: To obtain a copy of this report, Contact: Technology Transfer Div., P.O. Box 8757, BWI Airport, MD 21240. Refer to PO-15389/TN.

Vacuum Ampoule Isolates Corrosive Materials: A quartz vacuum container assures reliable thermophysical measurements of molten materials

See 0503

0905 Xenon-Chloride Laser With Argon as Diluent: The use of argon as a diluent gas produces a 30-percent increase in the lasing-output energy

Department of Energy, Washington, DC.

Oct 83 (J)

An improved XeCl avalanche-discharge exciplex laser provides high output powers equivalent to or exceeding those of a KrF laser. This is accomplished by using argon, rather than helium, as a diluent gas in the gaseous-lasing starting mixture. An improvement of approximately 30 percent in lasing-output energy is achieved at nearly atmospheric pressures; i.e., 20 psia, rather than at higher pressures required to reach equivalent energies in other rare-gas/halide

lasers. In addition, the use of argon reduces the cost of the mixture over either helium or neon. The device produces a 308-nm radiation which falls within the peak-absorption region of many ultraviolet dyes.

FOR ADDITIONAL INFORMATION: The patent on which this technical note is based is U.S. Patent 4,301,425, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1. For licensing information, contact: Office of Assistant General Counsel for Patents, U.S. Department of Energy, Washington, DC 20585.

SPACE TECHNOLOGY

0906 Flow Distribution in Hydraulic Systems: Program solves fixed or variable flow problems for series, parallel, or series/parallel systems

National Aeronautics and Space Administration, Washington, DC.

Sep 83 (A, D, J)

The General Flow Distribution Program analyzes pressure drops and flow distribution in closed and open hydraulic systems. It analyzes a system on the basis of incompressible flow even though the system may contain either compressible or incompressible fluid. The program has been used to analyze Space Shuttle orbiter hydraulic systems used for environmental control and life support. The General Flow Distribution Program solves fixed or variable flow problems for series, parallel, or series/parallel systems. This program is written in FORTRAN V for batch execution and has been implemented on a CDC CYBER 170-series computer.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center Suite 112, Barrow Hall Athens, GA 30602 Refer to MSC-20306.

Large, Easily Deployable Structures: Compactly folded structures are assembled quickly with relatively little effort

See 0136

0907 Lightweight Thermal-Protection System: Hexagonal honeycomb panels are light, durable, and easy to maintain

National Aeronautics and Space Administration, Washington, DC.

Jul 83 (D)

A thermal-protection system originally proposed for the exterior of Earth-to-orbit transports employs external hexagonal honeycomb panels held in place by Y-shaped plates. The system uses lightweight material and novel assembly methods to reduce weight and simplify maintenance. Other advantages include complete symmetry of components--there are no left- or right-hand parts and no asymmetry in thermal expansion. The thermal-protection system consists of an external hexagonal honeycomb panel that resists aerodynamic loads and the high temperatures associated with exit from, and entry into, the Earth's atmosphere.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: LAR-12880.

TRANSPORTATION

0908 Structural-Vibration-Response Data Analysis: Modal frequencies and dampings are obtained from free-decay records

National Aeronautics and Space Administration,
Washington, DC.

Sep 83 (A, D)

One area in dynamic testing that continues to be of interest is the selection of a proper analysis method for determining structural parameters from the measured data. A computer program was developed as a structural-vibration-response data analysis tool for use in the dynamic testing of the Space Shuttle. The program provides a fast and efficient time-domain least-squares curve-fitting procedure for reducing transient response data to obtain structural modal frequencies and dampings from free-decay records. The computer program and the methodology it is based on can be applied to the analysis of transient response data for a wide range of structures and might also be applied to such other areas as the analysis of seismograms. This program is written in FORTRAN IV for batch execution and has been implemented on an IBM 370-series computer.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center Suite 112, Barrow Hall Athens, GA 30602. Refer to MSC-20182.

0909 Tile-Failure Analysis: Probability model assesses failure risk of systems with widely-varying loads and material strength

National Aeronautics and Space Administration,
Washington, DC.

Oct 83 (A, D)

The Tile Failure Probability Model (TFPM) program was originally developed to quantitatively assess the risk of tile loss of a thermal-protection tile from the Space Shuttle orbiter. TFPM is fairly specific to the orbiter, but the basic technique might be applied in other structural design situations where the anticipated loads and material strength have significantly variable probability distributions. The model generates probability distributions of the tensile loads acting on a given tile during a mission and combines these with tile material-strength probability distributions to compute the probability of a tile tensile failure during the mission. The TFPM is written in FORTRAN IV and Assembler.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to MSC-20139/TN.

0910 Trajectory-Estimation Error Analysis: Program computes errors caused by assumed values of unadjusted parameters

National Aeronautics and Space Administration,
Washington, DC.

May 83 (A)

The Orbital and Geodetic parameter Estimation Error Analysis Program (ORAN) is a Bayesian least-squares simulation program for orbital trajectories. ORAN does not process data; rather, it computes the accuracy of the results of a data reduction if measurements are processed by a minimum-variance data-reduction program. Actual data may be used to provide the time when a given measurement was available and the estimated noise on that measurement. ORAN considers a data-reduction process in which a number of satellite data periods are reduced simultaneously. ORAN is written in FORTRAN IV and Assembler for

batch execution and has been implemented on an IBM 360-series computer.

FOR ADDITIONAL INFORMATION: Contact: Computer Software Management and Information Center, Suite 112, Barrow Hall, Athens, GA 30602. Refer to GSC-12766.

TRANSPORTATION

0911 Automated Information Directory Systems (AIDS): Determine optimum bus and/or subway routing for riders

Department of Commerce, Washington, DC.

Mar 83 (A)

AIDS is a singularly unique online computer assisted information system designed to determine the optimum bus and or subway routing between any two points. It was developed for us in the greater Washington, D.C. area. AIDS is currently used to answer about 50,000 patron queries per week. Using bus and subway times and routings, street names and address ranges, maps, landmarks, etc., AIDS determines the optimum trip by the time of day for the requested travel. The system is written in the FORTRAN programming language for implementation on a Hewlett-Packard 3000 series 11 computer using the MPE Release 3 operating system.

FOR ADDITIONAL INFORMATION: Contact: Mr. Al Wenberg, Computer Products Division, NTIS, Springfield VA 22161. Refer to PB83-109462/NAC.

0912 Battery-Charger/peed-Controller for Electric Cars: Addition of just a few components allows circuit to perform a dual function

Department of Energy, Washington, DC.

Jul 83 (B, C)

A field-chopper/battery-charger circuit for an electric vehicle not only controls the field excitation of the vehicle motor but also controls charging current to the battery. The circuit thus eliminates the need for a separate onboard battery charger. The only additional components required to provide charging control as well as motor control are a small high-frequency inductor and two isolation diodes.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,292,578, which is available from: Commissioner of Patents, Washington, DC 20231 for \$1.00. For licensing information, contact: Office of Assistant General Counsel for Patents, US DOE, Washington, DC 20585.

0913 Braking Tests for Tracked Vehicles: Tests evaluate braking performance under different circumstances

Army Materiel Development and Readiness Command,
Alexandria, VA.

Jul 83 (D)

Various tests are proposed to evaluate the performance of braking systems on tracked vehicles. Prepared for the U.S. Army Test and Evaluation Command, the tests include brake holding ability, stopping distance, steering brake performance, wet and freezing effects, braking potential, service brake efficiency, fade tests, brake system endurance, and human factors evaluation. The proposed procedures are readily adaptable to bulldozers and other construction vehicles.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by order-

ing the NTIS report, order number: AD-A08690, price code: A02.

0914 Can-Filled Crash Barrier: Inexpensive materials and simple construction protect motorists at low and moderate speeds

Department of the Army, Washington, DC.

Apr 83 (D)

A crash barrier composed largely of used aluminum beverage cans protects the occupants of cars in collisions with poles or trees. The lightweight, can-filled barrier was very effective in softening the impact of an automobile in head-on and off-angle collisions. Preliminary results indicate that the barrier is effective in collisions up to a 40 mi/h. The barrier holds empty beverage cans in a tear-resistant cloth bag encased in a collapsible container made of plywood and steel.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div., P.O. Box 8757, BWI Airport, MD 21240. Refer to NPO-15188/TN.

Ceramic Materials for Vehicular Engines: Study reviews the ceramic technology

See 0147

0915 Combined Braking System for Electric Vehicles: Hydraulic/regenerative braking system permits energy recovery for electric vehicles without compromising the braking performance

Department of Energy, Washington, DC.

Apr 83 (D)

A braking system for electric vehicles combines the advantages of hydraulic and regenerative systems into one. The arrangement retains the conventional action of hydraulic brakes and at the same time utilizes the regenerative feature to recharge the batteries. The system utilizes metering valves (spring-controlled diaphragm type) that regulate the hydraulic component of the braking force and a micro-processor to control the regenerative component.

FOR ADDITIONAL INFORMATION: The patent document on which this technical note is based is U.S. Patent 4,270,806, available from: Commissioner of Patents, Washington, DC 20231. Remit \$1.00. For licensing information, contact: Office of Assistant General Counsel for Patents, US DOE, Washington, DC 20585.

Costs and Benefits of Advanced Aeronautical Technology: Programs determine the advantages and disadvantages of advanced technology applied to civil aircraft

See 0006

0916 Drawbar Pull Test: A comprehensive test procedure is used for evaluating vehicle power available for acceleration, towing, or hill climbing

Army Materiel Development and Readiness Command, Alexandria, VA.

Aug 83 (D, K)

The drawbar pull test measures the available power a vehicle has for acceleration, towing, or hill climbing. Procedures for the drawbar and bollard pull tests were prepared for the U.S. Army Test and Evaluation Command. These procedures apply to wheeled, tracked, and amphibious vehicles for hard-surface, soft-soil, and water tests.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A086956, price code: A02.

0917 Evaluating Steering Systems in Automotive Vehicles: A publication provides descriptions of tests for objective evaluation

Army Materiel Development and Readiness Command, Alexandria, VA.

Jul 83 (D)

A document prescribes procedures for evaluating steering systems of wheeled and tracked vehicles. The document, which was prepared for the U.S. Army Test and Evaluation Command, describes cramping angle and steering ratio measurements and specifies tests of turning, overall steering performance, lane changing, drift, dead-engine steering, control on slopes and adverse terrain, and human factors.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A086957, price code: A02.

0918 Firefighting Vehicle Automatic Oscillating Turret

Department of the Air Force, Washington, DC.

Mar 83 (D)

A method has been developed to provide a more effective fire fighting capability by the driver/operator of the AS 32/p-4 aircraft crash rescue vehicle. An AS 32/p-4 vehicle was reconfigured with a 300-gallon per minute (gpm) automatic non-air-aspirating, bumper turret. This turret was evaluated as a replacement for the existing manually operated turret. The automatic turret was shown to have twice the effective discharge range, and achieved fire extinguishment 30 percent faster than the existing turret. This method is applicable for all Department of Defense crash fire vehicles. It allows for a more effective and efficient method of discharging fire fighting agent onto a fire, therefore significantly decreasing the time required for suppressing a fire.

FOR ADDITIONAL INFORMATION: Contact: J. Walker, HQ Air Force Engineering and Service Center/Airbase Survivability, Tyndall AFB FL 32403; (904) 283-6282.

0919 Glass-Fiber/Epoxy Truck Hood and Fenders: Lightweight molded composite replaces heavier sheet-metal parts

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 (H)

The hood-and-fenders assembly for a 5-ton truck can be made of glass-fiber/epoxy composite, according to a study conducted for the U.S. Army Tank-Automotive Command. The assembly would weigh 162 lb but would be about as strong as the present steel assembly that weighs almost twice as much. Stress/strain tests were conducted to select the glass-fiber-ply orientation sequences that gives the maximum strength with the minimum weight at temperatures up to 250 F.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A121320, price code: A07 or contact project officer Avery H. Fisher (313) 574-6478.

0920 Improved Coating for Torsion Bars: Longer bar life is bought at a small increase in cost

Army Materiel Development and Readiness Command, Alexandria, VA.

Jan 83 (D, H)

An improved protective coating for torsion bars has been developed for the U.S. Army Tank-Automotive Command.

The new coating is intended to replace the more-vulnerable tape-and-primer system that is used on the body section of suspension torsion bars. Modern suspension torsion bars that operate at high-stress levels are vulnerable to surface damage that typically occurs in operation. Eight different coatings (metallic, metallic-filled organic, and organic types) were subjected to environmental and damage tests. From these tests, the final candidate coating was a heat-curing polyvinyl chloride plastisol.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report order number: AD-D109951, price code: A04 or contact project officer Kazys Navasaitis (313)574-8721.

Lightweight-Composite Truck Components: Substantial weight and cost reductions are demonstrated

See 0718

0921 Microwave Ice-Accretion Measurement Instrument (MIAMI): Microwaves detect icing on aircraft surfaces

National Aeronautics and Space Administration, Washington, DC.

Nov 83 (K)

An instrument can be used on operational aircraft to warn the pilot of the onset of dangerous ice buildup or as a research tool for use in studying aircraft icing phenomena and in cloud research. Other ice-detection instruments use probes that project from the surface on which ice will collect, thus creating the problem of having to infer how much ice is really on the surface of interest. The MIAMI is embedded in the surface to be monitored and conforms to the surface contour. It automatically measures the ice forming on the surface of interest. The MIAMI is the only instrument that measures actual ice thickness and accretion rate in addition to giving an icing-onset warning.

FOR ADDITIONAL INFORMATION: Contact: Tech. Transfer Div., P.O. Box 8757, BWI Airport, MD 21240; (301) 621-0100. Refer to: LEW-13784/TN

0922 Primer on Navigation Systems: A report presents an overview of available techniques

Army Materiel Development and Readiness Command, Alexandria, VA.

Oct 83 (B)

A survey of navigation systems is presented in a report of the U.S. Army Tank-Automotive Research and Development Command. The survey represents the first of four phases of a program to recommend navigation techniques and equipment for military land vehicles. The report should be of general interest to engineers concerned with the design or use of navigation systems. It is clearly written and could serve well as an introductory or refresher text. The report discusses the fundamental principles of each of the major navigational systems in current use, along with the advantages and disadvantages of each for military land vehicles. Methods for determining position, velocity, and direction are presented, with definitions of common acronyms and other specialized terms.

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A088070, price code: A09 or contact project officer Gordon J. McInnes (313) 573-1325.

0923 Protective Coatings for Torsion Bars: Plastic corrosion-resistant coating is cost effective and improves service life

Army Materiel Development and Readiness Command, Alexandria, VA.

Nov 83 (H)

Eight different protective coating methods were evaluated for reducing costs and improving the service life of high-strength torsion bars used in vehicular suspension systems. The program was conducted for the U.S. Army Tank-Automotive Command. The previous method of applying a cost of primer paint followed by a spirally wound layer of adhesive polyene tape did not provide adequate resistance to abrasion and chemical attack. The eight type of coatings investigated included one metallic coating, three inorganic and organic metal-filled coatings, and four plastic coatings. Preliminary test were performed to rate the coatings relative to the tape and primer system..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A109951, price code: A04 or cotact project officer Kazays Navasaitis (313) 574-8721.

0924 Railroad Wheel Failure Analysis: Factors for changing design, materials, and operating conditions are considered

Army Materiel Development and Readiness Command, Alexandria, VA.

Oct 83 (D)

A program to improve the safety of rail transportation has resulted in the analyses of factors which lead to railroad-car wheel failures. The program was conducted for the U.S. Army Armament Research and Development Command. The results will be used to consider specific changes in material specifications and design configurations to improve wheel performance. In addition to an overview of wheel designs, materials, and failure types, the report covers two stress analyses via elastic/plastic finite-element method for three different wheel configurations. The thermal-stress analyses revealed larger variations in the rim of the curved-plate wheel than in either of the two straight-plate wheels. FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A110441, price code: A05 or contact project officer Charles Anderson (301) 278-2170.

0925 Ride-Quality Meter: Noise and vibration components are summed to produce an index of passenger discomfort

Army Materiel Development and Readiness Command, Alexandria, VA.

Apr 83 (B, K)

A portable ride-quality meter measures passenger discomfort and the acceptability of vehicle interior noise and vibration. The meter is especially suited for determining vehicle comfort and design tradeoffs and for comparing the ride quality of vehicles. The ride-meter output is in terms of discomfort units, which directly relate to passenger subjective acceptance of the measured environment.

FOR ADDITIONAL INFORMATION: Contact: Technology Transfer Div., P.O. Box 8757, BWI Airport, MD 21240. Refer to LAR-12882. Inquireies concerning nonexclusive or exclusive license for its commercial development should be ad-

dressed to the Patent Counsel, Langley Research Center, Hampton, VA 23665.

Semiempirical Estimate of Aircraft Wing Weight: Method draws on theoretical equations and a data base to optimize estimates

See 0024

0926 Torque Measurements on Tracked Vehicles: Procedures determine performance of power train track, and suspension

Army Materiel Development and Readiness Command, Alexandria, VA.

Sep 83 (D, K)

A document, prepared for the U.S. Army Test and Evaluation Command, discusses a test operations procedure for measuring torque in tracked-vehicle drive trains. The methods include checks of preoperational functions and evaluations of overall power-train efficiency, track and suspension losses, and transmission and final drive torques under a variety of operating conditions..

FOR ADDITIONAL INFORMATION: Detailed information about the technology described may be obtained by ordering the NTIS report, order number: AD-A103 787, price code: A02.

0927 Transportation Energy Data: A basic reference book contains voluminous data on energy consumption

Department of Energy, Washington, DC.

Oct 83 (C)

The sixth edition of the 'Transportation Data Book' is a desktop reference that provides statistics characterizing transportation activity and presents data on other factors influencing transportation. The purpose of the publication is

to present a large amount of relevant data in an easily retrievable and usable format. Each of the major transportation modes (highway, air, water, rail, and pipeline) is treated in separate chapters or sections. The book includes over 150 pages of tables and illustrations.

FOR ADDITIONAL INFORMATION: G. Kulp and M. C. Holcomb, Transportation Energy Data Book, Oak Ridge National Laboratory, Oak Ridge, TN 37830; (615) 574-5957.

0928 Sheathed Rock-Breaker Explosive Charge

Department of the Interior, Washington, DC.

Nov 83 (D)

An explosive charge was developed that will effectively break rock in underground mines and that can be safely fired without the use of blast-holes or the need for stemming. The Bureau of Mines developed a non-incendive, cylindrically-shaped explosive charge that will not ignite gassy or dusty atmospheres, even methane-laden air. The sheathed rock-breaker charge permits blasting to be performed safely since the explosive is covered with a flame-inhibiting material, such as salt, which is dispersed into a fine cloud upon firing. This prevents ignition of coal dust or methane in the mine air.

FOR ADDITIONAL INFORMATION: For licensing information contact the Office of the Solicitor, U.S. Department of the Interior, Patents Division, 18th and C Streets N.W., Washington, D.C. 20240. For additional technical information, contact Richard Mainiero, Pittsburgh Research Center, P.O. Box 18070, Pittsburgh, PA 15236; (412)675-6455.

SUBJECT INDEX

Index entries are selected to indicate important ideas and concepts presented in a technology summary. When using the subject index, be sure to look under terms that are narrow, broad, or related to a particular topic. The entries are arranged alphabetically by subject term. Individual items listed under subject terms are arranged alphabetically by title.

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Waste Granulation Process for Production or
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Title

Catalog reference number



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Airborne Detector for Acidic Sulfates: Impactor instrument samples fine-particle aerosols at altitudes from 300 m to 4 km
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Detecting Flaws in Welded Plates by Acoustic Emission: The technique offers a method of in-process correction of welding parameters
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See 0025

Two-Dimensional Grids About Airfoils and Other Shapes: Program treats arbitrary boundaries through solutions of Poisson's equation
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Airborne Detector for Acidic Sulfates: Impactor instrument samples fine-particle aerosols at altitudes from 300 m to 4 km
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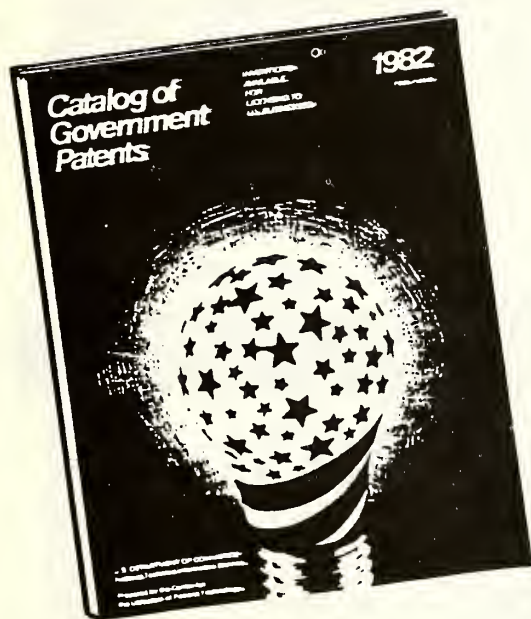
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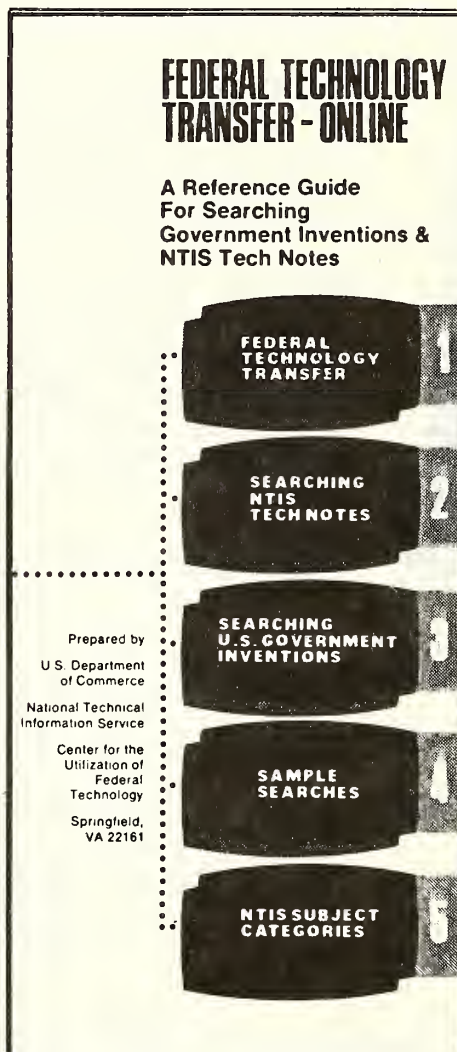
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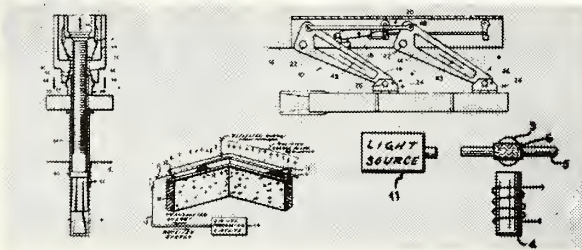
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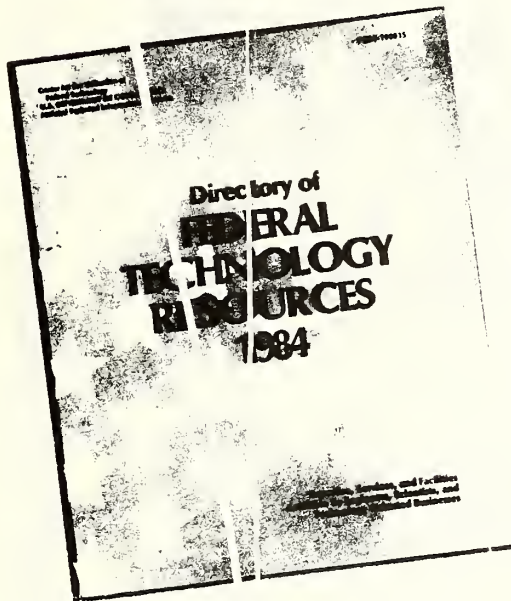
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SAMPLE TECH NOTES

NASA Tech Brief

National Aeronautics and Space Administration
Marshall Space Flight Center, Alabama

Pivot Attachment for Prefabricated

Proposed joint is flexible for easy assembly and then is rigidized by a threaded collar

The assembly of portable structures



Techdata Sheet
Feb 1982 82-01



Adhesive Selection

A list of adhesives suitable for bonding common construction materials is provided

Technology News

From the Bureau of Mines, United States Department of the Interior

Technology News describes tested developments from the Bureau of Mines Research Programs. It is published to encourage the transfer of this information to the minerals industry and its application in commercial practice. Mention of company or product names is for documentation only and does not imply government endorsement of a specific firm or product

Combination Bit Rapidly Drills Precision Boreholes in Soft Rock

Objective
To develop and design a bit combination will rapidly drill which one will rapidly drill and

Selected Technology for Licensing

Service

YARN SYSTEM

on directly from card web has been

The schematic is for a sub

vided into approx

TECHNOLOGY TRANSFER FACT SHEET

Robotics System Lends a "Hand"

A lightweight manipulator that is capable of grasping underwater objects has been developed and tested by the Naval Ocean Systems Center, San Diego



Lightweight Manipulator
Closes an object weighing 14 pounds in 4

For further information request
Navy Technology Transfer Fact Sheet
Code 1411
Naval Surface Weapons Center
Dahlgren, Virginia 22448
PB82-97095B



MANUFACTURING TECHNOLOGY NOTE

U.S. ARMY MATERIEL DEVELOPMENT AND READINESS COMMAND

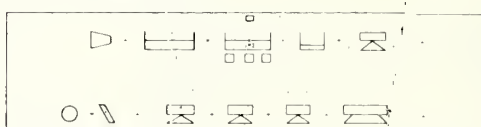
Office of Manufacturing Technology, Alexandria, Virginia

Report Number: NATIC-TR-0014 APRIL 1981

1982-97080

Carbon Fibers From Rayon and Acrylic Precursors

Activated carbon fibers are made by pyrolysis of synthetic yarns



A Continuous Rayon Pyrolysis Line was used to make carbonized yarn from a rayon yarn. The process conditions shown refer to a particular experimental run and are not optimum for commercial production

A report of the U.S. Army Natick Research and Development Laboratories describes experiments in the pyrolysis of rayon and acrylic yarns to produce highly solipive carbon fibers meeting specific strength and density requirements. The investigation was part of the development of activated carbon fibers for use in protective clothing

Evaluations were performed on three candidate precursor yarns. The first of these was a commercial rayon fire-cord yarn. In a continuous pyrolysis line with a maximum temperature of 1,000°C, frequent breaks and hotspots occurred due principally to chemicals remaining in the yarn after production. It was concluded that off the shelf rayon fire-cord yarns are unsuitable

The second candidate was a rayon yarn designed specifically for good carbonization characteristics. This yarn exhibited good pyrolysis behavior in the final version of the pyrolysis line (see figure). The level of activation was minimal, at 6.5 to 9.5 percent by weight increase in CO₂ vapor. The breaking strength of the carbonized yarn was poor

The third candidate was assigned to an Army Manufacturing Technology Note. It derived from the Natick Subject

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NTIC-TR-0014

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